Mechanical

AUTOMOTIVE INDUSTRIES

LAND — AIR — WATER

NOVEMBER 6, 1937

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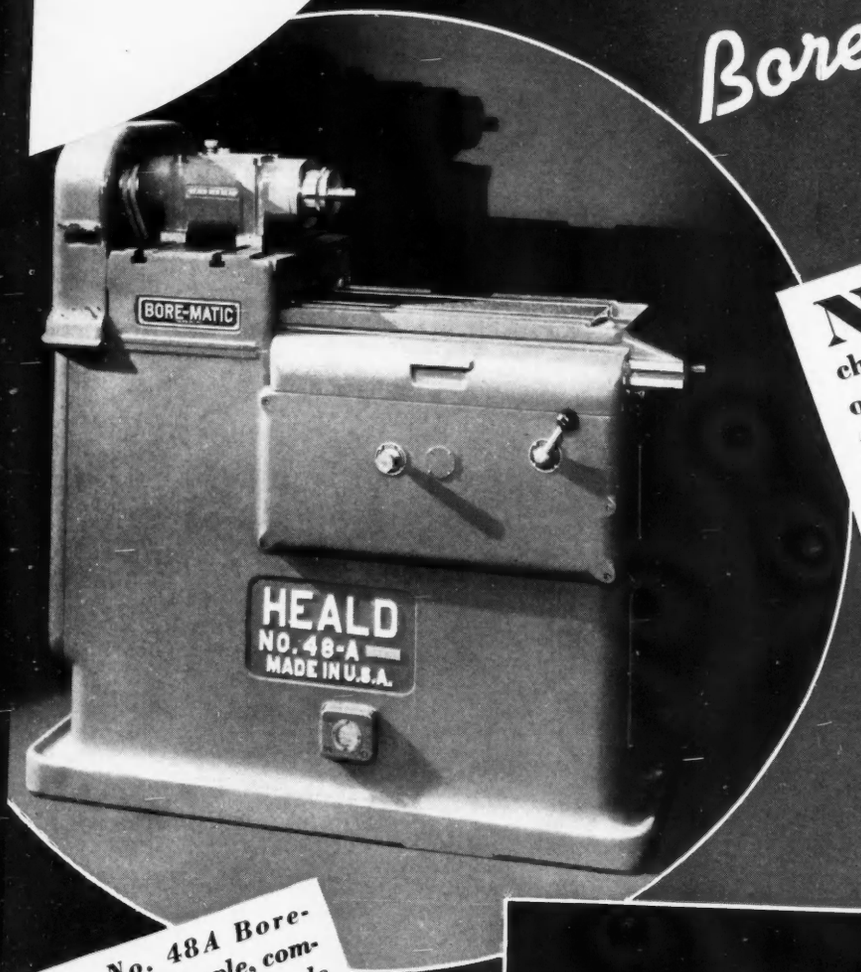
New Departure · Division General Motors Corporation · Bristol, Connecticut

NE ENGINE PARTS

PRECISION

Bored - Faced - Turne

on Heald Bore-Mati

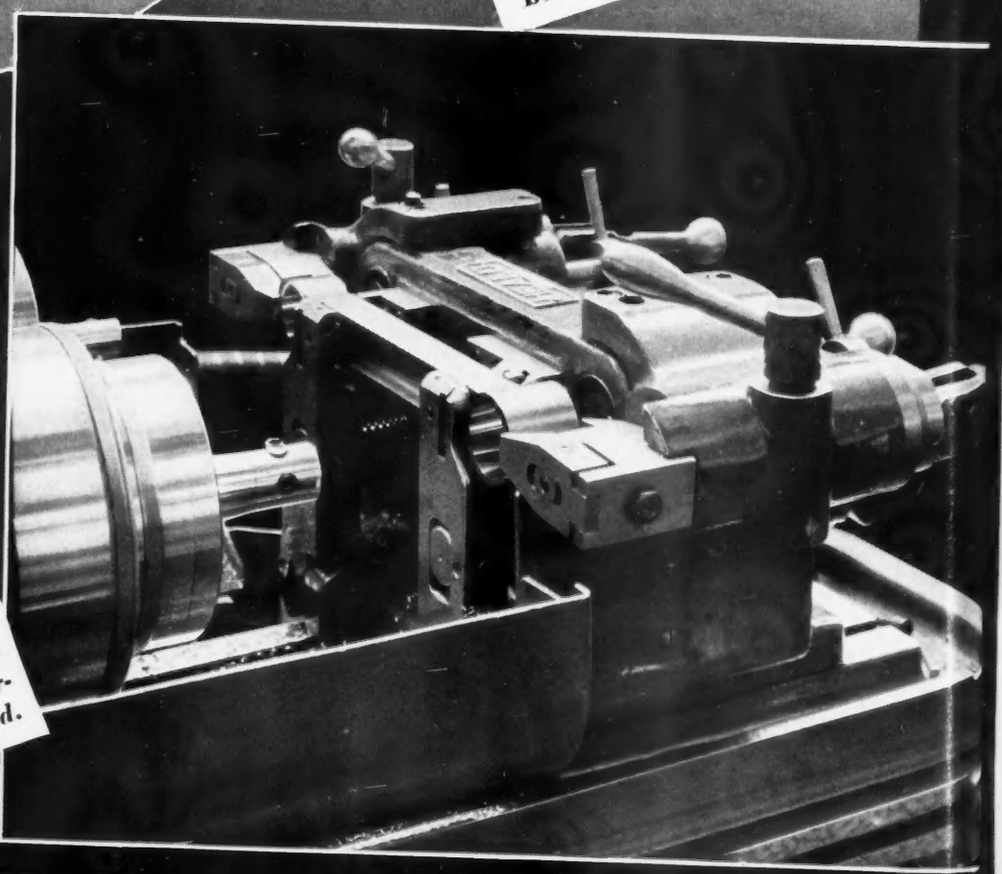


NOT only are Heald Grinding Machines established equipment in plants of nearly all airplane engine manufacturers but Heald Bore-Matics are also being selected for precision boring, facing and turning.

With a Bore-Matic one or more holes can be precision finished in the same piece to exceptionally close tolerances for alignment both with respect to each other and also in relation to other surfaces.

The Bore-Matics are ideal for such parts as pistons, rods of all kinds bushings, guides, etc.

The No. 48A Bore-Matic is a simple, compact, universal, single end machine readily meeting the requirements of airplane engine manufacturers.



Right, a No. 48A Bore-Matic is precision boring both ends of an airplane articulating rod.

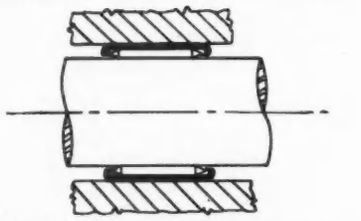
The Heald Machine Co Worcester Mass U S A

Compare The Value of the

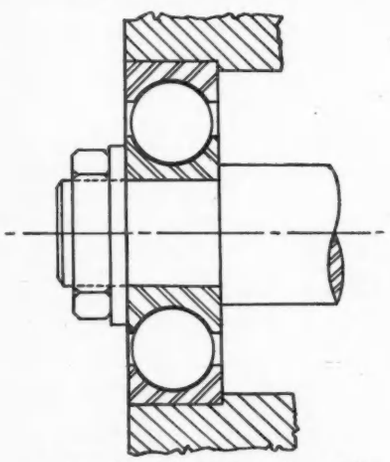
Torrington Needle Bearing

A COMPARISON of the Torrington Needle Bearing with a ball bearing and a bronze bushing of equivalent load rating clearly illustrates the advantages and value of this new Needle Bearing for many types of applications. In the accompanying table a detailed comparison is given of a Torrington B-1616 Needle Bearing with a 405 single row ball bearing and a bronze bushing of three square inch bearing surface. The speed curves for these three bearings are almost identical and therefore these standard sizes permit a fair basis for comparison.

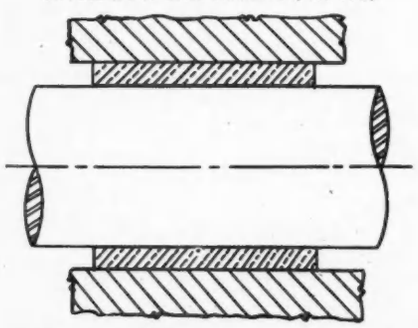
	TORRINGTON NEEDLE BEARING No. B-1616	BALL BEARING No. 405	BRONZE BUSHING 1½" x 1⅞" x 2"
Radial Load Capacity....	Same for all, with hard shaft required for Torrington Needle Bearing.	Same for all.	Same for all.
Thrust Capacity.....	None.	High.	None.
Space Required.....	1¼" O.D. x 1" I.D. x 1" Axially.	3-15/100" O.D. x 9-8/100" I.D. x 8-3/100" Axially.	1⅞" Radially x 2" Axially with 1½" shaft required to give needed bushing area.
Starting Friction Coefficient.	Slightly higher than ball bearing.	Slightly lower than Needle Bearing.	Considerably higher than either ball or Needle Bearing.
Running Friction Coefficient.	Slightly higher than ball bearing.	Slightly lower than Needle Bearing.	Same as Needle Bearing when extreme care is used in fit and in lubrication.
Installation.....	Needs accurate housing bore and shaft, but easy to install.	Same as Needle Bearing.	Requires very careful fitting to obtain good results.
Lubrication.....	Needs only ordinary care.	Same as Needle Bearing.	Continuous pressure lubrication to stand loads other 2 types will carry.
Price Ratios in 500 Lots..	Approximately one-fifth cost of ball bearing: one-third more than cost of bushing.	Approximately five times cost of Needle Bearing.	Approximately three-fourths cost of Needle Bearing: one-eighth cost of ball bearing.



TORRINGTON (B-1616) NEEDLE BEARING



SINGLE ROW BALL BEARING (No. 405)



BRONZE BUSHING—3 sq. in. surface area

These three bearings of the same radial load capacity vary widely in size and shape. All are shown in the same scale—a 40% reduction of actual size.

From this table and from the three illustrations at the left, which are shown in proportionate size, it is readily apparent that the Torrington Needle Bearing is the ideal bearing for use in many applications—particularly where small size, ease of installation, efficient lubrication, and low material cost are important factors in developing the design and determining type of bearing to be employed.

Manufacturers interested in the advantages and economies of the new Torrington Needle Bearing are invited to work directly with the Torrington Engineering Department in developing designs and laying out applications. A copy of the Torrington Needle Bearing Catalog giving more information will be supplied on request. Write for *Catalog No. 7.*

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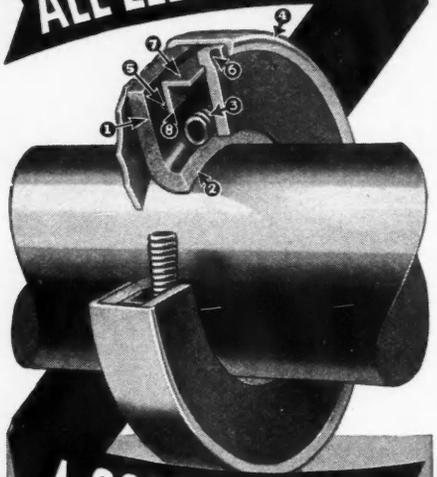
ESTABLISHED 1866
Torrington, Conn., U.S.A.

Branch Offices in all Principal Cities

TORRINGTON
NEEDLE BEARING

ALL ELEMENTS OF



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1. **PACKING MEMBER**—Leather continues its superiority as an oil sealing material. Self lubricating, non-abrasive, durable, unaffected by oils or greases, it is flexible, yet non-plastic. "Perfect" Oil Seals are also furnished with compound packing members but only for static temperatures (higher than 250° F.) or where incompatible chemical reactions are encountered.
2. **WIPING LIP** effectively prevents passage of lubricant or the entrance of foreign matter.
3. **TENSION SPRING** exerting pressure at wiping edge holds packing member on the shaft and automatically takes up any wear.
4. **OUTER CUP** encloses the entire assembly in one solid unit for a close press fit into housing assembly. Outside diameter centerless ground for accuracy.
5. **INNER SHELL** carries sharp bosses which penetrate leather of the packing member to prevent its rotation with the shaft.
6. **LUG** on the cover washer drops into a notch in the inner shell to further prevent rotation of internal members.
7. **INNER SHELL** properly spaces cover washer and flange of packing member to permit free action of the tension spring.
8. **FOOT OF INNER SHELL** positively clamps flange of packing member in the outer cup.

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Oil Retainer
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AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

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Published Weekly

Volume 77 Number 19

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Cable Address .....Autoland, Philadelphia

SUBSCRIPTION RATES: United States, United States Possessions, and all countries in the Postal Union, $1.00 per year; Canada and Foreign, $2.00 per year. Single Copies this issue, 25c.

Member of the Audit Bureau of Circulations
Member Associated Business Papers, Inc.

Entered as second-class matter Oct. 1, 1925, at the post office at Philadelphia, Pa., under the Act of March 3, 1879.
Automotive Industries—The Automobile is a consolidation of the Automobile (monthly) and the Motor Review (weekly), May, 1902; Dealer and Repairman (monthly), October, 1903, the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

Owned and Published by

CHILTON COMPANY
(Incorporated)
Executive Offices
Chestnut and 56th Streets, Philadelphia, Pa., U. S. A.
Officers and Directors
C. A. MUSSELMAN, *President*
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Published Weekly
Founded 1895

AUTOMOTIVE INDUSTRIES

November 6, 1937
Vol. 77, No. 19

Car Companies Watching Business

Production Schedules "Tentative" as Plants Wait for Clearer Picture of Sales; Ford Output Currently Increasing

The perplexing business outlook is keeping all production schedules in the automobile factories on a tentative basis. The trend of output continues upward and is likely to climb all month as result of the gradually gathering momentum of Ford operations which to date have contributed little to the industry's volume of 1938 model production. Companies which have been going full speed for some time are keeping a close eye on the retail market and stand ready to reef their sails promptly with any further unfavorable turn of the trade winds.

Three Ford assembly branches went into operation during the past week to augment the 1938 model production, which so far has been confined to a relatively light run at the Rouge plant. Remaining branches are expected to get under way during the coming week and the last half of the month should see output stepping up rapidly to full scale. Indications are that the current month's total for Ford plants will be somewhere in the neighborhood of last year's November output of 56,000 cars and trucks. So far, other leading producers are holding to their schedules but if they decide to curtail before the month is out, the industry's daily rate could be easily maintained by the rising Ford production.

If there is no change in schedules, Ford, General Motors and Chrysler should account for nearly 375,000 units this month, which, with the total for the independents, would bring the industry's November output well above the 495,799-unit total for November last year.

Delivery reports for the first reporting period of November and the status of unfilled orders at that time are expected to determine whether the current month's schedules are to be trimmed. No clear picture was obtained at the New York show which was disappointing in attendance although sales are said to have measured up favorably with a year ago. Many felt that the show was held about two weeks too early and there is considerable sentiment for a later show next year.

Sizing up the sales picture from data at hand, automobile officials declare that demand is by no means as vigorous as a year ago. Current deliveries compare favorably with this time last year and in some instances are running well above, but there is not the advance buying that was noted in 1936. Fewer retail orders are piled up, which means that the factories will be caught up with the initial demand for new models much earlier. —H. E. G.

Dealer orders for the new 1938 DeSoto, received from dealers from all parts of the country, are double what they were at this time last year, Byron C. Foy, president of the DeSoto Division of the Chrysler Corporation, revealed. At the same time, shipments from the factory in Detroit for the month of October were more than 100 per cent ahead of the same period a year ago, Mr. Foy stated. Retail deliveries in 1937 were 84 per cent over the 1936 model year, he said.

A continuation of the record breaking sales of the 1937 models is indicated for Cadillac-

(Turn to page 667, please)

C. E. BLEICHER
. . . just named vice-president and general manager, DeSoto division, Chrysler Corp.

CIO Scorched in Elections

Detroit Defeat Seen Showing Little "Solidarity" at Polls; Resentment Feared Future Factor; Lose at Akron, Too

The CIO went into total eclipse in Detroit's municipal election last Tuesday when voters turned out in unprecedented numbers to administer a smashing defeat to all its candidates.

Richard W. Reading, the conservative standard bearer, decisively defeated the CIO's nominee, Patrick H. O'Brien, for mayor by a vote of 260,957 to 154,050. The five labor leaders, picked by the CIO for council members, failed to place. Nearest to victory was Maurice Sugar, UAW attorney, who trailed tenth in a list of 18 nominees, from which the voters selected nine. Frankensteen, Doll, Thomas and Reuther were farther down the line.

Throughout the campaign there was but one issue, the threat of the CIO to dominate municipal affairs. Early in the contest, O'Brien announced that the CIO proposed "to seize the reins of government in Detroit and every other large city in the country." This statement became a much-riddled target at the hands of the opposition before the campaign had gone far. O'Brien made several attempts to inject other issues without success. In one of the concluding speeches of the campaign, the UAW's president, Homer Martin, declared: "We say to them all this is just the beginning. We expect to build our political forces in every city in this State. We expect organized farmers to reach out and take our hands. We have just started to build, and in the words of John L. Lewis, 'Labor is on the march.' "

Unhappily for the CIO, its first major political effort was made in a city where non-partisan government

(Turn to page 662, please)

Use New Insurance Base

A base of 90 per cent of the delivered-at-factory prices for 1938 automobiles will be used in the revised insurance manuals, to replace f.o.b. prices as premium bases, it was agreed by the underwriters and the insurance committee of the Automobile Manufacturers Association. Conferences were held on the subject, necessitated by the ending of

(Turn to page 663, please)

Chrysler's Quarter Profit Up

Nine Months' Earnings Slightly Lower Than in 1936 Though Sales Increased; Dividend of $3 a Share Declared

Chrysler Corp. reported net income for the nine months ended Sept. 30 of $40,424,211 or $9.29 per share, compared with $41,975,327 or $9.63 per share for the like period in 1936. Based on a comparison of reports, net income for the third quarter alone was indicated at $12,967,603 or $2.98 per share against $12,501,592 or $2.87 per share on a slightly smaller number of shares outstanding for the September quarter of last year.

Sales for nine months amounted to $572,217,107, comprising 877,734 passenger and commercial units, compared with $479,819,688, with the unit total 768,503, for the 1936 period. Third quarter sales were indicated at $162,528,853 against $121,184,789 for the September quarter last year.

K. T. Keller, president, who signed the report, stated that according to the company's latest information retail sales for the first nine months of the year showed an 11 per cent increase over 1936 while export shipments showed a gain of over 13 per cent.

Directors, at the meeting Oct. 22, declared a dividend of $3 a share payable Dec. 13 to stock of record Nov. 12. The payment raises the total of dividends for 1937 to $10 a share against $12 a share paid in 1936.

The balance sheet of Sept. 30 showed cash and security holdings at somewhat higher levels as at the close of 1936, $47,209,484 in cash and $14,585,505 in securities. Car shipments against drafts were $4,263,112 against $10,460,516, while the statement of inventories less reserves showed $53,546,150 against $60,565,446. Total current assets were $126,957,063 against $140,101,687 on Dec. 31. Total current liabilities were $48,202,602 on Sept. 30 against $75,131,875 on Dec. 31, the reduction accomplished principally in accounts and payrolls payable and in tax reserves. Contingency reserves were increased during the nine months by about $3,400,000 to $15,611,432.

The cash holdings were below those of Sept. 30, 1936, when the figure was $53,885,306, part of the funds having apparently gone into inventories which were far above those a year earlier, standing at $37,136,331 on Sept. 30, 1936, and into actual production, indicated in the receivable car shipments against drafts. These a year ago were only $2,339,767.

A note to the income statement showed that charges for depreciation and amortization for nine months, a part of cost of sales, amounted to $11,566,049 against $8,958,598 in 1936.

Studebaker Reports

The Studebaker Corp. reported a net loss for the September quarter of $665,941 compared with a net loss of $286,283 for the like part of the last year. The company was out of production for several weeks in the quarter for model changes but is now building and selling the 1938 cars, according to Paul G. Hoffman, president. For nine months the company reported net income of $508,577 or 23c. a share on the 2,196,416 shares outstanding at the end of the quarter, against $708,547 or 32c. a share for the like period of last year, based on the present common capitalization. Net sales for the quarter were $13,734,928; for the nine months $55,259,458.

The balance sheet of Sept. 30 showed cash holdings of $9,197,405 and sight drafts of $1,834,831. Trade receivables were $341,822 and net inventories $8,547,161. Total current assets were $20,189,468 and current liabilities $9,845,031.

Company Earnings

Hupp Motor Car

Reported a net loss for the third quarter of the year of $459,177 against a net loss of $229,085 for the like portion of last year.

Yellow Truck & Coach

Reported net income for the third quarter of the year of $1,298,090 against $1,614,306 for the third quarter of 1936. Net for nine months was $2,874,739* against $3,788,737 for the like period last year. Sales for nine months were $59,099,226 against $45,347,607 for nine months of last year.

* Common share capitalization changed. No comparison.

Kelsey-Hayes Wheel

Reported net income for the nine months ended Sept. 30 of $789,082, $1.46 a share on the class A and class B stock under the participating provisions of the A shares. This compared with $990,278 or $1.87 a share on the combined stocks for the like period of last year.

(Turn to page 685, please)

Tax Complexity Shown

Representative Automobile Company Pays 25 Levies

One of the reasons for the present movement on the part of industry to have the taxing system in this country simplified is the number of different taxes which the average corporation must pay. Many require separate returns. The desire for simplification has nothing directly to do with the soundness or unsoundness of any particular type of tax.

There are ten "groups" of Federal taxes on corporations, it was reported by a representative automobile manufacturer. Within several of the groups, of course, is the necessity of calculating the total amount of the tax, often made up of rates in different brackets. The ten groups include normal income tax, excess profits tax, surtax on undistributed profits, capital stock tax, old age pension levy, unemployment insurance tax, stock transfer tax, securities and exchange commission registration and filing fees, telephone and telegraph tax, and other excise and miscellaneous taxes. These latter include gasoline, automobile and real estate taxes, which might also be classed as state or local.

In addition there is a list of 11 tax groups which are imposed by different states, some payable in only one state, others in several. They include: Franchise taxes, bonus tax, capital stock tax, corporate loan tax, "business" taxes, income taxes, excise taxes, unemployment insurance levies, "blue-sky" commission fees, and initial qualification fees.

There are also certain city taxes such as the gross receipts tax, personal property tax, tax on inventories and local sales tax.

GM to Pay $1.50 Dividend

Directors of the General Motors Corp. declared a dividend of $1.50 at a meeting Nov. 1. The payment raises the total for this year to $3.75 compared with earnings for nine months, reported a week ago, of $3.46 a share on the common stock. The dividend just declared will be paid Dec. 13 to stock of record Nov. 12. In 1936 the company paid a total of $4.50 including $1.50 paid Dec. 12. GM has paid two dividends of $1 each and one of 25 cents, the latter declared and paid during the strike period early in 1937. The regular quarterly dividend of $1.25 a share on the preferred stock was also declared Nov. 1, payable Feb. 1, 1938, to stock of record Jan. 10.

September Financing Off

Dollar volume of retail new automobile financing for September, according to a preliminary "sampling index" by the Department of Commerce, was 3.3 per cent below that for the same month of the preceding year and 17.3 per cent below the figure for the month of August. September financing volume was otherwise higher than for any September except 1929. It was 20 per cent below the 1929 total. The September decline from August was the largest seasonal drop since 1929. Each year has seen a drop from August to September. Last year it was 9.4 per cent, and in 1935 it was 17.1 per cent.

Stutz Making 100 Units

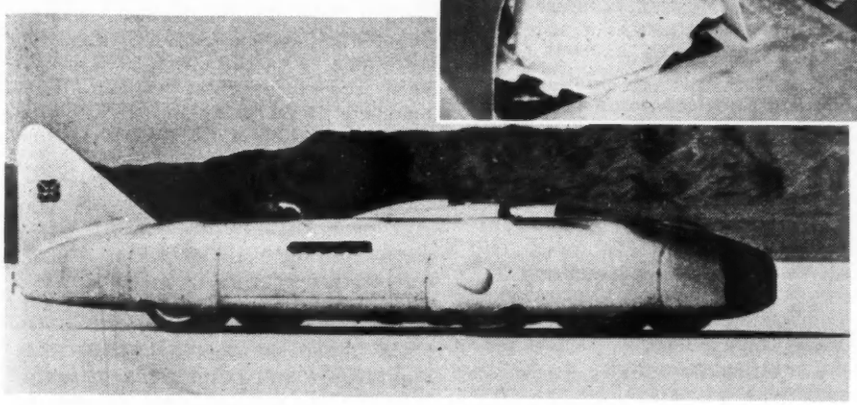
Production was started Oct. 29 on 100 Pak-Age cars at the Indianapolis plant of the Stutz Motor Car Co. of America following the granting of permission by Federal Judge Robert C. Baltzell. Arthur B. Cronk, trustee in bankruptcy for the firm, had sought the order to enable the firm to continue its income through the period required to set up a creditors' plan for reorganization under the Federal Bankruptcy laws.

New Hayes Trailers

A new line of Hayes welded steel trailers will be shown at the Chicago automobile show, opening Nov. 6. The trailers are slightly longer, have an exterior trunk compartment, and a new caster jack assembly.

NEW SPEED RECORD

apparently will be set by Capt. G.E.T. Eyston with this giant racing car at the Bonneville Salt Flats in Utah. He drove it at 309.6 m.p.h. on a trial a week ago, setting a new mark, but was unable because of clutch trouble to complete the two runs in opposite directions required by the AAA for official speed trials. The car is driven by two engines, is 30 ft. long, weighs six tons. There are four steering wheels at the front and duals at the rear for traction. The front pair of steering wheels has a narrower tread than the rear pair. Capt. Eyston is shown seated in the car with the hatches open. "Wing flaps" on the sides near the tail serve as additional brakes.



Diesel Use Seen Broader

The forecast that "if we keep on making the progress that we have during the past four or five years, some day we might get Diesel engines into automobiles," was made by C. F. Kettering, vice president of General Motors Corp. and general manager of its research laboratories division, at a luncheon given by A. P. Sloan, Jr., chairman of the board, in New York during Automobile Show week. Mr. Kettering said the problems are far different so far as truck engines and engines for railroad use are concerned, and the latter have been successful while the truck Diesel is a large and growing field because of a different type of demand.

H. L. Hamilton, president of the Electro-Motive Corp., LaGrange, Ill., division of GM, stated that Diesels in railroad service have proven successful both in switching service and in main line service.

Ralph Budd, president of the Burlington Lines, supported Mr. Hamilton

(Turn to page 692, please)

Safety Body Re-elects

Officers and members of the operating committee of the Automotive Safety Foundation were re-elected at the annual meeting of the foundation's board of trustees held in New York. Officers re-elected were: president, Paul G. Hoffman, president of the Studebaker Corporation; vice president, C. C. Carlton, president, Automotive Parts and Equipment Manufacturers; vice-president, F. B. Davis, Jr., president, U. S. Rubber Company; vice president, A. O. Dietz, president, Commercial Investment Trust; secretary-treasurer, Byron C. Foy, president, De Soto Motor Corporation; assistant treasurer, Alfred Reeves, vice president and general manager, Automobile Manufacturers Association, and director, Norman Damon. The operating committee includes the officers and: Lee J. Eastman, president, Packard Motor Car Co. of New York; D. C. Fenner, vice-president, Mack Bros. Motor Car Company; R. P. Fohey, secretary, Chrysler Corporation; Paul W. Garrett, director of public relations, General Motors Corp.; J. E. Otis, Jr., president, Stewart-Warner Corp.; Robert P. Page, Jr., president, the Autocar Co.; C. O. Skinner, executive secretary of the Automotive Parts & Equipment Manufacturers.

MEN OF THE INDUSTRY

PIETER W. SCHIPPER of the Pratt & Whitney Aircraft division, United Aircraft Corp., has sailed for Melbourne, Australia, where he will become chief engineer of engine division of Commonwealth Aircraft Corp., Pty., Ltd., which has just received a license for the manufacture of the series H Wasp engine.

H. SIDNEY SMITH, consulting engineer, Union Carbide & Carbon Corp., has been awarded the James Turner Morehead medal for 1936 by the International Acetylene Association. It will be presented at Birmingham, Nov. 10, at the association's annual convention.

COUNT ALEXIS DE SAKHNOFFSKY, designer of automobiles and other industrial products, has been engaged as consulting stylist by the Murray Corp. of America, C. W. Avery, president of the corporation, announced. Count Sakhnoffsky's activities on behalf of the Murray Corporation will include research in the development of new lines for the motor car of the near future as well as design of instrument panels and interiors.

HOWARD DUNBAR of Worcester, Mass., was elected president of the National Machine Tool Builders Association at the association's convention at Hot Springs, Va. **NEWTON A. WOODWORTH** of Detroit was elected first vice-president. Mr. Dunbar is vice-president of the Norton Co. and general manager of the grinding machine division. Mr. Dunbar has been associated with the Norton Co. for 24 years. He served last year as first vice-president of the association.

H. E. KOMITCH has been elected vice-president and general manager of the Prest-O-Lite Battery Co., Inc., Indianapolis.

HAROLD W. ZIPP has been appointed chief engineer of the Stearman Aircraft, Wichita, Kansas, and

H. F. BROWN, plant superintendent, has been made vice-president in charge of manufacturing.

F. C. SCHULZE has been appointed to the post of assistant sales manager of the Waukesha Motor Co. Mr. Schulze became associated with Waukesha in 1928.

(Turn to next page, please)

Men of the Industry

(Continued from preceding page)

DENIS MULLIGAN, chief of the regulation and enforcement division of the Bureau of Air Commerce, has been appointed the bureau's assistant director.

H. W. BOULTON, Murray Corp. of America, is the new general chairman of the automotive and machine shop section executive committee, National Safety Council. Vice-chairman is

L. B. LOOMIS, Ternstedt Mfg. division, General Motors Corp. Other sub-committee chairmen on the executive committee include:

C. W. BISHOP, Lycoming Mfg. Co.

L. B. BATELY, Yellow Truck & Coach Mfg. Co.,

W. KRAUSER, Willys-Overland Motors, Inc.,

DR. A. L. BROOKS, Fisher Body Detroit division, General Motors Corp.,

NILS JUELL, Hayes Body Corp.,

M. J. McCARTHY, Fisher Body Corp., and

V. I. TROTTER, Plymouth division, Chrysler Corp., while members at large include:

M. A. CLARK, U. S. Rubber Products, Inc.

HOYT L. FRACHER, Detroit Steel Products Co.

MERLE C. HALE, General Motors Corp.,

R. A. SHAW, Murray Corporation of America,

CARL L. STORCK, Delco Products division, General Motors Corp.,

R. F. THALNER, Buick Motor Co., and

C. T. WINEGAR, Chrysler Corp.

C. H. WONDRIES has been appointed director of Studebaker's new national accounts division, a new sales unit intended to operate in the large-user field.

DAVID M. HARVEY, for some years associated with leading oil and chemical manufacturers, has been appointed superintendent of the oil department at the Philadelphia plant of E. F. Houghton & Co. He will have charge of the production of a number of special oils.

CLARENCE E. BLEICHER has been appointed vice-president and general manager of the DeSoto Motor Corp., division of Chrysler Corp. He succeeds Herman L. Weckler who recently became vice-president of the Chrysler Corp. in charge of public relations.

J. L. KIRKHOPE, has been appointed as manager of the truck division of the general sales department of General Motors Products of Canada, Limited, Oshawa, Ont. Mr. Kirkhope for the past six years has been assistant fleet and commercial manager.

K. M. SCHAEFER has been appointed assistant to the general manager of the Federal Motor Truck Co., assigned to sales. it was announced by R. W. Ruddon, vice-president and general manager. Mr. Schaefer's experience in the automotive field dates from 1922.

DR. JAMES SHELBY THOMAS, president of the Chrysler Institute of Engineering, Detroit, will deliver the keynote address at the annual convention of the International Acetylene Association at Birmingham, Ala., Nov. 11.

NEWTON D. BAKER of Cleveland, Ohio, formerly Secretary of War, has been elected a director of the Goodyear Tire & Rubber Co., to fill the vacancy on the board left by the death of Col. Grayson M. P. Murphy.

ARTHUR McCAUGHNA of Detroit has become president of the General Foundry & Mfg. Co., Flint, Mich., succeeding C. W. Bonbright. Mr. McCaughna goes to the foundry company from the Norge Refrigerator Co.

H. I. HAZZARD, American Bantam's chief engineer was with the Fort Wayne division of International Harvester for the seven years preceding his present connection. From draftsman he advanced to assistant to chief engineer in the truck division and his later responsibilities were connected with research and development. He has contributed to various technical magazines and is credited with being one of the few engineers to win a technical bout with Bill Stout.

W. B. ROBINSON has been named sales representative in Canada for the Willys Export Corp., it was announced by Ralph J. Archer, vice-president and manager of the export corporation. Mr. Robinson will make his headquarters temporarily with Train Brothers, Ltd., Willys distributors at Toronto.

Akron Hits CIO Politics

Akron business and industrial leaders saw strong possibilities of an immediate halt to the decentralization of tire manufacturing and of a re-concentration of operations there as a result of the overwhelming defeat administered to organized labor with its strong CIO backing, in the Akron mayoralty election Tuesday. Mayor L. D. Schroy, Republican and "Home Rule" candidate was reelected by a majority of 8112 votes over former municipal Judge Garnet L. Patterson, running on the Democratic ticket as the candidate of organized labor.

The election plainly was a test of the strength of the CIO in Akron where it had recently won collective bargaining rights by wide margins in two of the city's largest tire factories—Goodyear and Goodrich.

Prior to the election it was freely predicted that if labor won the mayoralty race the major tire companies, which had been harassed by scores and hundreds of sitdown strikes, would accelerate their decentralization and further reduce operations in Akron. Goodyear already has set up branch tire plants in Jackson, Mich., Gadsden, Ala., and has subsidiary companies in Maryland and California. Firestone has a large new tire plant at Memphis, Tenn., a latex products plant at Fall River, Mass., and is building a wheel-and-rim and accessories plant at Riverview, Mich. It also has a Pacific Coast factory. Goodrich has a new tire plant with 5000 daily capacity at Oaks, Pa., and a new mechanical rubber plant.

CIO leaders openly backed the Patterson candidacy in organized labor's fiercest battle in any Ohio city to become a political power. Patterson formerly was an attorney with the National Labor Relations Board. The vote in Akron set an all-time high for a municipal election with 80,302 votes cast, Schroy getting 44,207. Schroy had the solid backing of Akron business and industrial leaders.

GM, Chrysler Strike Votes

Meetings to determine whether a strike vote should be taken at the Plymouth Motor Corp. were held Nov. 4 by UAW members employed at the plant. The union has charged that the Plymouth corporation violated its agreement with the union. There have been repeated fights between UAW members at the plant and the Independent Association of Chrysler Employes.

A strike vote taken among UAW workers in the Pontiac Motor Co. plant in Pontiac, following a dispute with the management over classification, wages and seniority showed the members 90 per cent in favor of striking, Chas. Madden, UAW regional director, announced. Meanwhile, in Flint, the UAW announced that the Fisher Body Plant No. 1 will be picketed in an attempt to enroll non-union workers in the plant. Production will not cease.

Final arrangements have been made for a conference Nov. 13 of UAW representatives from all General Motors Corp. plants, Homer Martin, UAW president, announced. Martin said that a union committee now negotiating with GM officials will continue to meet until Nov. 13 and will then place before representatives to the union conference the provisions which have been settled in the negotiations.

CIO Scorched in Elections

(Continued from page 659)

was a much cherished institution, wrested from the machine politics of ward-heelers two decades ago. Reading championed non-partisan and uncontrolled government, characterizing his opposition as "political marionettes of CIO bosses." O'Brien, distinctly partisan, represented well-organized labor minority and attempted also to invoke the support of Democrats. One of his slogans was "let's bring the New Deal to Detroit." In fact his entire campaign had a New Deal flavor, with lavish promises of lower rents, reduction in taxes and food prices. He advocated municipal ownership of the Detroit Edison Co., Detroit City Gas Co. and "a yard-stick milk distributing plant."

While purporting to represent labor, the CIO slate by no means received the united support of industrial workers in general. Officially, the AFL endorsed Reading, although some of its discordant units backed CIO candidates who also derived some strength from other voting groups. The UAW carried on a strenuous campaign, with precinct organizations set up in all the wards where wage earners predominated. Money was spent freely, and there were reports of a substantial fund made available for the Detroit campaign by outside CIO units. One authority figures the campaign cost the CIO $175,000. He said the union had offered to buy $80,000 of radio time but succeeded in obtaining only a small part of this.

In view of the appeal to labor generally as well as to New Deal sym-

pathizers, it is significant that the CIO was unable to muster a vote equal to the membership which the UAW alone claims in Detroit — around 200,000. Mayoralty candidate O'Brien garnered the biggest CIO vote, with a total of 154,050. This represented not only CIO members but also the wives and husbands of many and a considerable vote from outside the organization, so that the showing of actual members was far from that of a united front. This, according to observers, means that the union not only has many members who refuse to follow their leaders in politics but may also be unwilling union members, signed up under pressure.

In the calm of the morning after, Detroit business and industry were taking stock of their victory at the polls. While highly pleased with the long range view, spokesmen were not so cheerful about the outlook just head. They feared the radical element would be harder to control, that their resentment over defeat would find expression in a spirit of unrest and vindictiveness, and might easily be aroused to strike.

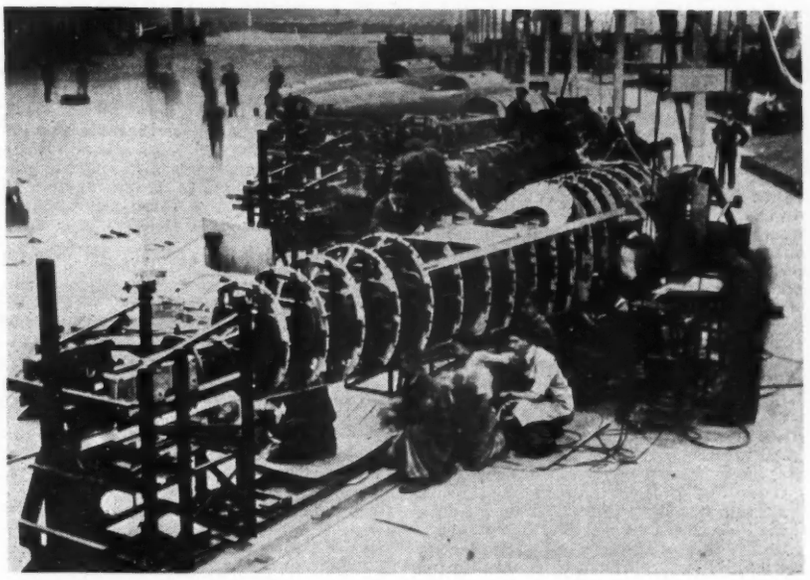
Union leaders, it was pointed out, are definitely on the spot. They have been collecting dues on promises to take over the City Hall. They failed to place a single representative and now face-saying is in order. Unless promises are made and fulfilled, collections of dues fall off. Even before the election, the UAW found union interest waning and dues coming in too slowly. They began to picket plants to bring pressures on delinquents. The picketing, however, is not interfering with plant operations.

Strike Outlook

Because of the position in which the union leader find themselves, it is considered probable that some attempts will be made to stir up labor strife now that the election is over. But the chances of conducting successful strikes have been greatly lessened by recent developments. For one thing, business is off. Under these conditions, employers are more disposed to wage a finish fight against unreasonable demands. And demands for wage increases would be considered unreasonable, after the orgy of pay boasts during the past year and in view of the business outlook. Moreover, the CIO is not likely to be so aggressive after its decisive defeat at the polls. Certainly, with this verdict before them, it would seem that authorities will not be ready to condone the strong-arm tactics used in last winter's disturbances.

The landslide for Reading, who proclaimed impartial enforcement of the law, was regarded as an emphatic disapproval of the CIO methods by a vast majority of the citizens of Detroit. There were no collateral issues of any kind in the campaign—no cross currents, such as in the New York election. The electorate was passing judgment on the CIO alone. That is why the election in Detroit was watched by the entire country, and the results are expected to have an influence on Washington. Some predict also that the outcome may have an important bearing on the conferences between the CIO and the AFL, since it undoubtedly weakened the former's hand.

According to one authority, the Detroit contest demonstrated again the futility of labor unions trying to run the politics of a city, a lesson the AFL learned long ago. The Federation, he said, found that it was more practical to make deals with one or the other of the major parties than to attempt to go it alone, and that is something the new CIO is just finding out.



Acme

SHADOW factory operations in England. This is the assembly of aircraft fuselages at the Austin plant at Birmingham. This is one of a number of "shadow factories" where the Royal Air Force is aided in the production of airplanes. The Humber and Standard plants are doing other parts of the work. The Austin factory is new.

Use New Insurance Base

(Continued from page 659)

"f.o.b." prices and the general substitution by the industry of factory delivered prices which now include ordinary equipment. The present prices, with the exception of a few, are stated with Federal tax included but without any State or local taxes. The Ford Motor Co. quotes prices without Federal tax.

J. S. Marvin, assistant general manager of the AMA, explained that the use of full delivered prices or any of the other plans proposed would have assigned cars to higher premium groups than the old f.o.b. base, and that the 90 per cent of delivered-at-factory price base worked out with most cars in their former groupings. Premiums will be revised in accordance with the new method.

K. C. Pledges Ford Safety

Written pledges were transmitted Nov. 1 from City Manager H. F. McElroy of Kansas City to the Ford Motor Co., intended as the first step toward reopening the company's plant in that city.

McElroy conferred with Henry Ford and Harry Bennett, personnel manager, for four hours in Detroit last week. At the end of the conference, McElroy indicated that the plant would be opened pending assurance of police protection for Ford employes. The plant was closed following a dispute between Kansas City officials and the company over police protection for non-striking workers.

UAW Files Ford Complaint

The International Union, United Automobile Workers, has filed a complaint against the Ford Motor Co. with the National Labor Relations Board, charging the company with violations of the Wagner Act, according to a statement by Richard T. Frankensteen, assistant president of the UAW.

His statement said the company is alleged to have taken immediate discriminatory action against various of its employes whose only misdemeanor was offering sworn testimony during the first NRLB hearings in response to the compulsion of subpoenas.

Dealer Decoration Plans

Because of the results achieved through its recent campaign to encourage modernization of dealership buildings, the Ford Motor Company is preparing for distribution a new manual of dealership interior decoration.

The new book—first of the kind to be issued by a leading manufacturer in the automotive industry—will outline the most attractive arrangement of displays, rearrangement of sales rooms to provide the best use of available space.

Material for the new volume, accumulated in an exhaustive field survey, has been adapted to the special needs of Ford dealers through consultation with interior decorators and automobile sales authorities.

Airtemp Exhibit

An exhibit of air conditioning equipment has just been opened by Airtemp, Inc. at the International Automobile Salon in the Chrysler Building, New York.

Business in Brief

Written by the Guaranty Trust Co., New York

Business Recedes

There was a further recession in general business activity during the week ended October 23. The decline was led by the steel industry; and smaller losses were reported in car loadings, bituminous coal production, and automotive activity. The weekly business index compiled by the *Journal of Commerce* stood at 97.5, as compared with 100.0 for the preceding week. Retail trade showed an increase above that in the preceding week of from 2 to 5 per cent, while the gain above the level a year ago was from 5 to 15 per cent.

Railway freight loadings during the week ended October 23 totaled 773,353 cars, which marks a decline of 36,591 cars below those in the preceding week, a reduction of 42,889 cars below those a year ago, but a rise of 62,732 cars above those two years ago.

Production of electricity by the electric light and power industry in the United States during the week ended October 23 was 5.1 per cent above that in the corresponding period last year.

The rise in exports continued during September. Their aggregate value in that month was 7 per cent above that in the corresponding month last year. Imports showed a rise of 8 per cent but were 5 per cent below those in the preceding month. Foreign trade during September resulted in an export balance of $63,368,000, while trade during the first nine months of this year yielded an import surplus of $48,000,000.

Farm Income Up

Income from farm marketings during September amounted to $816,000,000, which marks an increase of $64,000,000 above that in the corresponding month last year, according to the Bureau of Agricultural Economics. The increase in income was due almost entirely to the sale of crops, for the income from livestock was approximately the same as last year.

Professor Fisher's index of wholesale commodity prices for the week ended October 30 stood at 88.1, as compared with 89.3 the week before and 89.5 two weeks before.

The consolidated statement of the Federal Reserve banks for the week ended October 27 showed an increase of $5,000,000 in holdings of discounted bills. Bills bought in the open market and Government securities remained unchanged. Money in circulation declined $27,000,000, and the monetary gold stock increased $8,000,00.

Automotive Metal Markets

Non-ferrous Metals Weaken Again; Sheet Steel Orders Come In Larger Volume; No Price Raggedness Seen Yet

Non-ferrous metal prices turned further in buyers' favor Nov. 1. Spot Straits tin was offered at 47⅝c., with future deliveries quoted at as low as 47 cents and buyers few and far between. It is estimated that consumers are holding 5000 tons more tin than they did at the end of summer.

The world's visible supply of the white metal is reported at 22,865 tons. Two months ago it was 12½ per cent higher and tin sold then at around 58½c. or about 25 per cent over the prevailing quotation. Statistics, therefore, have proven themselves a poor compass by which to gauge the tin market. Announcement at the New York office of the International Tin Research and Development Council that the International Tin Committee had decided that the January-March, 1938, production quota will be 85 per cent of standard tonnages, compared with 105 per cent during the current quarter, has so far had no influence on the market, not even on first quarter 1938 delivery prices. Feeling is, however, decidedly jumpy, and when the market on Monday completely ignored a sharp rise in sterling exchange, which ordinarily would have lifted prices here, it merely reflected the floundering character of the market, in which there would be no surprise at anything that might happen.

Copper prices moved into definitely lower ground on Nov. 1, when metal in second hands was offered at 11½c., delivered Connecticut basis. One of the custom smelters quoted 11¾c. and mine producers 12c. The so-called export price was 10.90c. At these levels there was neither indication of foreign buying nor quickening of the demand from American consumers. Opinion as to the market's future trend is sharply divided. Mine producers look for early world-wide adjustment of output to current demand, while in other quarters, with the all-time 1933 low of 4.90c. in mind, predictions of further leveling of prices are freely indulged in. Copper is now selling slightly above the average for the last ten-year period.

Both lead and zinc have developed an easier undertone, a dip in the London price for the former metal together with disappointing demand from storage battery manufacturers and a $3 per ton cut in zinc ore prices being the causes.

Steel Orders Rise

Cleveland and Youngstown district sheet and strip mills booked orders for moderate tonnages of sheets and strip steel from automobile manufacturers and parts makers this week. With another dip in the rate of employed ingot capacity, which this week declined to 48.6 per cent, the lowest rate since December, 1935, incoming automotive commitments, while by no means representing what might be called heavy tonnages, make a decidedly encouraging showing, and are the only bright spots in the situation.

Changes in the executive ranks of the leading steel producing company were pounced upon as presaging stiffer competition in the steel market.

The program for expanding facilities for the production of those descriptions of steel which are chiefly used in automotive manufacturing was formulated long ago and has been partly carried out. The impression prevails in the steel market that when this and the many additions to capacity which the "independents" have made and are continuing to make, are in full operation, the competitive set-up in the market will undergo somewhat of a change, but this does not necessarily imply ragged price conditions. An all around increase in capacity will undoubtedly benefit buyers of steel, but need not develop price cutting, which to many is the alpha and omega of competition. One of the large "independents" will soon put into operation an additional automatic continuous mill for the production of 98-in. wide body stock.

—W. C. H.

Gift to Oxford

Lord Nuffield, head of Morris Motors, Ltd., Great Britain, has made a donation of £1,000,000 ($4,960,000) to Oxford University for a site for the building and endowment of a new graduate college to be devoted to the collaboration in social and economic studies of scholars and men of affairs. He has also made two other gifts to the University recently, bring his benefactions to that institution up to £1,300,000. These other gifts include one of £100,000 for the construction and equipment of a laboratory for physical chemistry.

Bender Develops Coach

The Bender Body Co. has developed a new, all-steel, light-weight intercity coach. It has a hot water heating system, individual seat well lighting, reclining seats and baggage compartment. Seating capacity is 21 to 25.

. . . slants

PARKING—*Toronto, Ont., is considering a new parking plan which would follow the sun. It is suggested that parking be permitted only on the east and north sides of streets from Nov. 1 to April 30, and on the west and south sides from May 1 to Oct. 31. The reason is that heavy snows on the south and west sides of streets forces motorists to park well out from the curb, but in winter the warmth of the sun removes much of the snow from the north and east sides of the streets.*

INTO THE EAST—*Covered Wagon says that the trailer which will be taken deep into China on a missionary trip next spring by Fr. Christopher Sullivan will be the first to penetrate the interior of that country. It will be completely equipped with altar and necessary living equipment and an infirmary. Rear wheel will be duals to aid in traversing the rutted roads expected.*

THEY DRIVE—*More than 30 per cent of the employes of the Schenectady works of the General Electric Co. now drive automobiles to work, compared with less than 12 per cent in 1929, it was shown in a survey just completed. There is now one car for every 3.3 employes, while figures for 1929 showed one car for every 8.8 employes. Dur-*

ing the peak years of 1928 and 1929, when the number of those employed in the works and offices totaled more than 30,000, the greatest number of cars parked by workers was 3600. At the present time, with about 18,000 employes, or 44 per cent less than in 1929, the number of cars parked is 5500 each week day.

TROUBLES IN MEXICO—*An unusual combination of hardships affected the Mexican automobile industry during August and September. Operators of for-hire cars are usually large buyers of replacement parts and during much of that period they were out of the market for lack of funds. The rainy season appeared to have reduced the operators' income. Then, due to the difficulties experienced by the petroleum industry in Mexico late last summer there was a gasoline shortage which forced the operators to tie up their cars for lack of fuel.*

Indiana Truck Lights

The Indiana state safety committee has ruled that long motor trucks and house trailers operating on Indiana highways will be required to carry directional signal lights on fenders after Jan. 1, 1938. Acting under a 1937 state safety law, the committee specified that all trucks of 14 or more feet in length, and all trailers, and all trucks with cabs so constructed as to prohibit the driver from making a hand signal visible to other motorists, must be equipped with the lights. The lights will be placed on front fenders and rear fenders, or body of the truck, depending upon construction. The lights were tested at Purdue University engineering laboratory. The lights will be operated inside the vehicle and will flash on the side toward which the driver intends to turn. The ruling will apply also to trucks pulling trailers.

R. C. Durant

Russell C. Durant, son of W. C. Durant, founder of the General Motors Corp., died at Los Angeles on Oct. 30. He was known as a driver of stock cars in the Indianapolis Speedway races early in the last decade and also headed the Chevrolet and Durant company selling activities on the West Coast between 1921 and 1931. He was also interested in the manufacture of airplanes.

40 Years Ago

with the ancestors of AUTOMOTIVE INDUSTRIES

Minor Mention

The Panhard Co. are using considerable aluminum in certain parts of their motors, thus reducing weight 100 to 150 pounds.

N. Escalante y Peon, manager of railroads in the city of Merida, Yucatan, has purchased a motor car from an American manufacturer, and is now conducting experiments with it, the results of which he promises to let our readers know in the near future.

On Nov. 9, Arthur L. Clough delivered a discourse on motor carriages before the Manchester (N. H.) Board of Trade. For the present Mr. Clough was inclined to favor the gasoline motor; although he thought that when charging facilities were common the electric vehicle would have the preference.

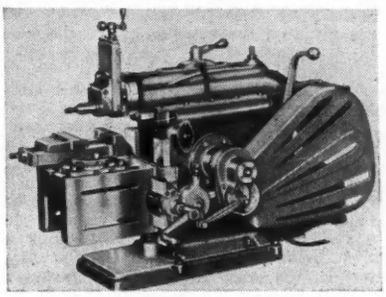
From *The Horseless Age*, Oct., 1897.

TOOLS OF TOMORROW

Shaper

. . . new Atlas machine with cutting speeds of 3½ to 116 ft. per minute.

Atlas Press Co., Kalamazoo, Mich., has brought out a new 7-in. shaper. The ram-driving mechanism on this equipment is of the bull-gear type; stroke (quick return) is from ½ in. to 7⅜ in. V-belt drive from motor to bull-gear spindle provides four speeds between 45 to 200 strokes per minute. Automatic cross feed provides five feeds in either direction between 0.005 in. and 0.025 in. per stroke.



Atlas 7-in. bench shaper.

Some of the essential specifications of the shaper are: cutting speeds, 3½ to 116 ft. per min.; table travel, 8½ in. horizontal, 4½ in. vertical; maximum distance table to ram, 5⅛ in.; minimum distance table to ram, ⅝ in.

Chaser Grinders

. . . three models in new line offered by Landis Machine Co.

New chaser grinders in a line consisting of three models that cover the entire range of sizes of Landis chasers have been developed by the Landis Machine Co., Waynesboro, Pa. Grinding wheels are mounted on the armature shaft of the motor, eliminating gear or chain drives. Two grinding wheels, one cup and one straight, are supplied as standard equipment.

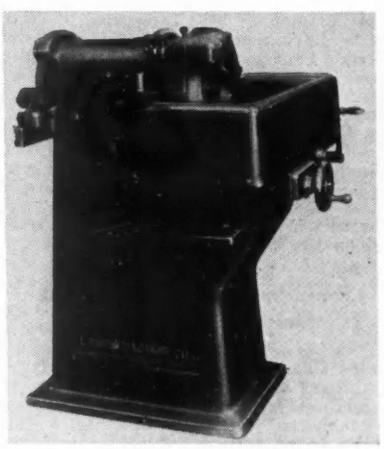
The straight wheel is used for grinding rake angles of Landis bolt chasers where a leadscrew is not used. A rest that is adjustable to any angle is provided to facilitate this operation. The straight wheel may also be used for miscellaneous grinding.

The cup wheel is used for grinding the lead and rake angles of all pipe chasers and bolt chasers when the thread is to be cut with the use of a leadscrew.

Of the three new models, the model "O" is a small machine designed primarily for grinding Landis chasers for the smaller sizes of Landis die heads. The No. 1 grinder is a heavier duty machine and may be used for grinding all Landis chasers up to 1⅞ in. wide. The No. 1½ grinder is an extra-heavy duty machine. The latter is the only one of the three models in which means are provided for the use of a coolant on the cup wheel, to reduce heat generation and, consequently, eliminate the possibility of burning the chasers. A centrifugal pump, gear driven directly from the armature shaft, and located inside the bed of the machine, provides a flow of coolant from the reservoir to the grinding wheel.

This same model is also the only one that employs a traversing table at the cup wheel end. Models "O" and No. 1 employ a new method for in-feeding the chaser and passing it back and forth across the face of the wheel. The swivel head, in which the chaser is gripped for grinding, is mounted on a cylindrical base. The cylindrical base operates on a spindle and is fitted with a long handle which is used to swing it in an arc paralled to the wheel. A feed screw is provided through the spindle to in-feed or withdraw the swivel head.

The infeed screw and the bearings on which the swivel head base operates,



New Landis chaser grinder.

are protected from the possibility of grit entering the sliding surfaces. A sliding bushing in the machine bed extends into the cylindrical base and completely covers the spindle and feed screw. Provision is made for filling the bushing with heavy grease when the swivel head is withdrawn to the position where it would operate with a

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AUTOMOTIVE ABSTRACTS

Endurance Limit of Nitrided Steel

In a paper read at the meeting of the Society of German Engineers at Kiel, F. Mayr of Augsburg referred to the endurance characteristics of nitrided steel shafts under fluctuating torsional load. The problem of increasing the endurance characteristics of steel shafts is of great importance in marine practice because of the tendency to increase engine speeds, which brings an increased number of critical speeds of torsion into the operating range.

With practically all kinds of steel, both alloyed and unalloyed, the endurance limit is lower for notched than for ground specimens. Unfortunately, practically all mechanical parts have "notches" of one kind or another, such as screw threads, ring grooves, etc., hence in their case one can calculate only with the endurance limit for notched parts. On the other hand, if a test specimen of nitrided steel is tested in an endurance testing machine, it is found that there is practically no difference in the endurance limit whether the specimen is "notched" or ground. This was brought out in research work dealt with by R. Mailander in the Z.V.D.I., Vol. 77, p. 271, and by A. Jünger in Mitt. Forsch. Anst. G.H.H. Konzern, Vol. 3, pp. 55 and 85. The results of these researches make it appear that for nitrided steel more than twice the endurance limit of notched chrome-nickel steel can be figured with.—Z.V.D.I., Oct. 16.

Free-Piston Compressor

A British patent, recently issued to Frau T. Junkers of Munich, Germany, indicates that one of the latest engineering problems studied by the late Hugo Junkers was that of the free-piston engine-compressor. The drawings show an engine of the familiar Junkers type, with two power pistons in the same cylinder, each power piston connected to a compressor piston of larger diameter. The two pairs of pistons are in driving connection with each other through two racks with a spur pinion between them. As the racks, which drive the fuel injection pump, connect to the compressor pistons off center, they tend to cock the pistons in their cylinders, and to offset this effect, coiled springs are arranged in the compressor cylinders which are compressed by the pistons toward the end of the in-stroke, when fuel is being injected and there is therefore considerable load on the racks.

Crank Spacing for Two-Stroke Multi-Cylinder Engines

In a paper on Special Requirements of Marine Diesel Engines, read by F. Mayr at the annual meeting of the German Society of Engineers at Kiel last June, although the general subject is that of Diesel installation in large vessels, there appears some information on the subject of balancing that should be of interest to designers of automotive Diesels.

In marine service, torsional vibration now is generally eliminated by the use of spring dampers and spring couplings. This solution of the torsional-vibration problem had salutary effects in other fields. In deciding upon the crank spacings for multi-cylinder engines it was formerly necessary to see to it that the forces which excite torsional vibration remained small. The result often was poor balance of reciprocating parts. At present the requirement of low exciting forces of torsional vibration is less important and more attention can be given to requirements of mass balance.

Crank spacings that were formerly ruled out by considerations of torsional vibration are now permissible. This is particularly important in connection with two-stroke engines, in the case of which for even cylinder numbers from six up, the crank spacings which give complete balance for four-stroke engines are out of the question, because with such spacings the structural parts between the two central cylinders would be subjected to stresses due to simultaneous explosions in the adjacent cylinders. Besides, simultaneous explosions in two cylinders would result in a less uniform torque curve.

The paper contained a table showing the mass-balance characteristics of a number of six-cylinder two-stroke engines as used in many motor ships. This table, by the way, is said to be indicative of the historical development of two-stroke marine engine design from the standpoint of crank spacing. Originally the cranks were located in three planes at 120 deg., and while this gave perfect mass balance it was objectionable on account of two explosions always occurring at the same time, so that the continuity of the torque was no greater than in a three-cylinder engine. In what appears to be the most advantageous arrangement for such an engine, the six throws are equally spaced at 60 deg., the firing order being 1-5-3-4-2-6. With this arrangement there are no free forces of the first and second order (primary and secondary free forces) due to reciprocating parts, no free forces due to rotating parts, no primary rocking couples due to reciprocating parts and no rocking couples due to rotating parts, but there is a secondary rocking couple due to reciprocating parts whose value is $3.46\ P\ l\ \lambda$, where P is equal to $m\sigma\omega^2$, m being the mass of reciprocating parts; r, the crank radius, ω, the angular velocity in radians per second; l, the connecting-rod center-to-center length, and λ, the ratio of connecting-rod length to crank radius.—*Z. V.D.I.*, Oct. 16.

Colored Headlamps

A report recently issued by the British Department of Scientific and Industrial Research deals with the use of colored bulbs for automobile headlamps. Dr. C. C. Paterson, chairman of the Illumination Research Committee, says in an Introduction that an authoritative statement on this subject is greatly needed as thousands of motorists believe that colored light is better than white light for driving in fog or at night, and use colored bulbs for that reason. The Report seeks to give a summary of the most reliable information on the subject extant at the present time. It sets out to answer the following four questions: Can the driver of a car at night see better if he uses headlamps giving colored light? Is the disturbance of a driver's vision by the headlights of other cars reduced if they use colored lights? Can the driver see objects at a greater distance in mist or fog if he uses headlights emitting colored light? Can the occurrence of colored objects and backgrounds be turned to advantage by using headlights emitting colored light?

The final conclusion of the Report, which includes valuable scientific notes, may be summed up as follows: None of the claims made in favor of using a colored—and in particular a yellow — headlight beam, rather than a white beam of no greater power, has been substantiated. The claim for a greater range of visibility in fog may be regarded as definitely disproved. On

(Turn to page 690, please)

Ethyl Licensees Up

Jobbers licensed to sell Ethyl gasoline during the first eight months of 1937 were 11.5 per cent more numerous than in the corresponding period of 1936. Ethyl license agreements, from January 1 to August 1 of this year, were issued to 758 jobbers, who constituted 52 per cent of the total number obtaining licenses from the Ethyl Gasoline Corp. during these months. In the same interval in 1936, the corporation granted 476 Ethyl licenses, which represented 40.5 per cent of the whole number issued.

Letters

to AUTOMOTIVE INDUSTRIES

Law of Gear Durability

It is interesting to note that the modified static stress formula proposed by McMullen and Durkan in *Machinery*, June, 1922, when applied to helical spur gears, in which the variables are more determinate than in spiral bevels, does not give results comparable to the result obtained for spiral bevels (J. O. Almen et al. Sept. 25, 1937). The present writer has felt that the analysis, particularly in the case of heat-treated materials, is not so simple. Fatigue life, while modified by the stress imposed, is also a function of the tooth outline. Fatigue cracks which develop in gear teeth and eventually result in failure can be located as follows: The fatigue line begins in that point of the gear root surface where the radius of curvature of the profile changes most abruptly. These two points (one on each side of the tooth) may or may not be symmetrically located with regard to the center-line of the tooth, depending on the method of generation. In spiral bevels they are not symmetrical, for several reasons; in spurs they usually are. The fatigue line then joins these two points, is approximately perpendicular to the average direction of the tangents at the points (when there is an abrupt change in direction, there are two tangents at each point), and, furthermore, is the shortest line which fulfills these conditions. This theory can be substantiated by the use of minimum principles. To incorporate it in a formula is still rather difficult.

The logarithmic aspect of the fatigue curves is readily explained without the use of stress formulae. Fatigue in gearing, looked at from a macroscopic point of view, is similar to growth or decay in living organisms. For let c represent the fatigue life in cycles of a specimen, then at any given stress, s, and the corresponding fatigue life c, the decrement in fatigue life $\triangle c$ is proportional to the increase in stress $\triangle s$ and to the present fatigue life c. Hence, if k is a suitable constant, and using differential notation,

$$dc = -k\ c\ ds$$

Integrating

$$\log\ c = -k\ s + k'$$

The exponential law of growth in nature is well substantiated by experiment. This relation holds, of course, for identical samples submitted to varying stress. It should not hold for different samples subject to varying stress, unless the tooth profiles and root surfaces are similar. In the case of spiral bevel and hypoid gears, the tooth surface is so different for different ratios and for the two sides of the teeth that the applicability of a simple exponential law seems highly improbable.

JOHN G. URBANIK,
Rochester, N. Y.

Drop Forging Award

The Drop Forging Association has received a certificate of recognition for forward-looking activity and meritorious achievement from the Association of Trade Association Executives.

Plant Notes

Decentralization Plans, Expansion Involved

Construction of an entirely new plant for the Sunlight Electrical division of General Motors in Warren, Ohio, is announced by John B. Estabrook, general manager. The plant will be a one-story structure, 240 by 600 ft. providing approximately 120,000 sq. ft. of manufacturing floor space. Completion is scheduled for March 1, 1938. No definite decision has been made regarding the disposition of the present Sunlight property. The construction is the third major expansion by GM in Warren within the past two years. Two additions have been made to the Packard Electric property in that time, the last one dedicated late in August. The new plant will practically double the present manufacturing area of Sunlight, providing greater capacity, more efficiency and better workmanship in building the products. The number of employees will not be materially affected at present.

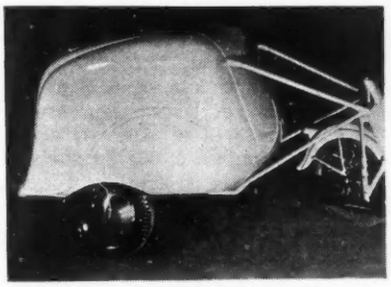
The Ford Motor Co. has placed an order for 45,000 tons of structural steel for use in building the first new structure in the recently announced $40,000,000 improvement program.

As part of its decentralization program, Firestone Tire & Rubber Co. has purchased seven factory buildings formerly occupied by the American Printing Co., at Fall River, Mass., and will establish there complete facilities for the manufacture of latex products. The property is reported to be worth approximately $1,000,000, and to have over 500,000 sq. ft. of floor space. Firestone, like other major tire manufacturers, not only has been transferring considerable production equipment out of Akron, but has been diversifying its lines. The company's Memphis, Tenn., tire plant soon will have capacity of 10,000 tires daily. Ground has been broken for the company's new steel products plant near Riverview, Mich., where Firestone will produce wheels and rims, batteries, spark plugs and stainless steel beer kegs.

Construction has been started at Indianapolis by the John Deere Plow Co., Moline, Ill., of a modern office, warehouse and display room to cost $200,000 and occupy 100,000 sq. ft. of floor space, according to Charles T. Moreland, vice-president and general manager of the John Deere Plow Co., of Indianapolis, branch of the parent company.

Car Ownership Shown

One third of the total automobiles in the United States are owned by 7,000,000 families having incomes of less than $20 a week, it is indicated by a survey of automobile ownership made by the U. S. Department of Commerce in 50 cities and embracing a quarter of a million families. The American Petroleum Industries Committee is using the results of the survey in its drive for lower gasoline taxes.



CYCLE TRAILER

developed by the Peninsular Metal Products Corp. It weighs 380 lb., is three feet high, and has 61 cu. ft. of storage capacity. The hitch, and the power brakes on the "Tralette" to improve stability.

This survey of automobile ownership and family income in 50 representative cities, the most comprehensive survey of its kind yet made, revealed that:

(1) 34 per cent of the automobiles are owned by families with incomes of less than $20 a week.

(2) 55.5 per cent of the automobiles are owned by families with incomes of less than $30 a week.

(3) 73.1 per cent of the automobiles are owned by families with incomes of less than $40 a week.

(4) 88.9 per cent of the automobiles are owned by families with incomes of less than $60 a week.

(5) Less than 2 per cent of car-owning families have incomes as high as $100 a week.

Remon Heads Boat Body

John A. Remon, Washington, D. C., telephone company engineer, has been elected the ninth president of the American Power Boat Association. He succeeds George W. Sutton, Jr., who has headed the association since 1935. The association is 34 years old.

Watching Business

(Continued from page 659.)

LaSalle, according to the general sales manager, D. E. Ahrens. By the accumulation of 11,000 orders since the latest series of cars were displayed to dealers, retail sales for the twelve months ended Nov. 1, Mr. Ahrens reported, not only far outdistanced the previous year, but broke the former record volume for a model by 11 per cent. During the 12 months ended Nov. 1 retail sales reached 45,585. The 1928 model set the earlier record of 40,965 cars. Stocks of 1937 models on hand average one plus per dealer.

Chrysler's Millionth

Chrysler Corp. has completed its one millionth car for the year 1937, thereby bettering its 1936 record by six weeks. By manufacturing 1,000,000 Plymouth, Dodge, DeSoto and Chrysler passenger cars, Plymouth and Dodge commercial cars, and Dodge trucks in ten months, the corporation has exceeded all its previous ten months' production records. Production for the first ten months of this year exceeded that for the same period last year by about 20 per cent.

Tractor Prices

The U. S. Department of Agriculture, in a bulletin forecasting higher farm machinery prices, pointed out that tractor prices dropped 7 per cent from 1929 to 1933 but that price increases since then have carried the level of tractor prices to a point 3 per cent above 1929.

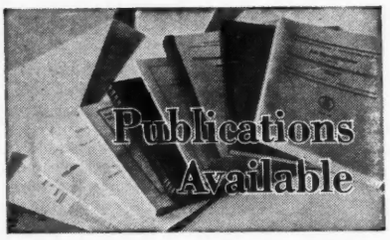
Mack Trucks Report

Mack Trucks, Inc., reported net income for the September quarter of $324,327 or 54c. a share against $364,311 or 61c. a share in the like quarter last year. Net income for the June quarter was $645,961 or $1.08 a share. For nine months the net income was $1,264,587 or $2.11 a share against $876,200 or $1.46 a share for the 1936 period.

New Truck Registrations*

	Sept. 1937	August 1937	Sept. 1936	NINE MONTHS 1937	NINE MONTHS 1936	Per Cent Change, 9 Months, 1937 over 1936	Per Cent of Total Nine Months 1937	Per Cent of Total Nine Months 1936
Ford	15,791	15,859	16,613	164,864	146,973	+ 12.1	32.12	29.84
Chevrolet	16,252	18,806	15,177	152,190	169,726	− 10.3	29.65	34.46
International	6,460	7,446	6,514	59,672	54,223	+ 10.0	11.62	11.01
Dodge	6,346	6,685	7,788	50,975	67,329	− 24.2	9.93	13.66
G. M. C.	3,496	4,394	3,112	35,547	20,787	+ 71.0	6.92	4.22
Plymouth	1,364	1,570	162	11,062	2,222	+396.0	2.15	.45
Diamond T	623	627	795	6,751	6,177	+ 9.3	1.32	.25
White	391	411	501	4,611	4,138	+ 11.8	.90	.84
Studebaker	350	541	317	4,443	2,484	+ 79.0	.87	.51
Mack	406	421	418	4,389	2,864	+ 53.5	.86	.58
Terraplane	380	521	135	4,246	1,578	+169.0	.83	.32
Reo	249	317	515	3,449	3,117	+ 10.8	.67	.63
Federal	128	158	240	1,944	2,181	− 10.8	.38	.44
Autocar	183	171	122	1,681	944	+ 78.0	.33	.19
Brockway	94	134	138	1,243	1,301	− 4.4	.24	.26
Indiana	111	97	133	1,142	1,242	− 8.0	.22	.25
Divco	104	115	62	946	751	+ 26.1	.18	.15
Stewart	75	87	139	943	955	− 1.2	.18	.19
Willys-Overland	75	105	251	794	1,880	− 57.8	.15	.38
Stutz Pak-Age Car	46	57		530			.10	
F. W. D.	26	30	10	338	241	+ 4.0	.07	.05
Sterling	31	14	15	265	170	+ 56.0	.05	.03
Kenworth	9	5		101			.02	
Schacht	3	1		40			.01	
Miscellaneous	123	129	121	1,160	1,437	− 19.1	.23	.29
Total	53,116	58,681	53,276	513,328	492,720	+ 4.1	100.00	100.00

*Less Wisconsin for July, August and September.



Latest issue of "The Metal Working Press," that for October, contains a number of **articles on procedure.***

A **brochure** describing the facilities and organization of Motor Specialties, Ltd., Auckland, New Zealand, has been issued.*

Dun & Bradstreet, Inc., has just completed a **survey of wholesalers** in the automotive equipment field. Cooperating in its preparation was the Motor & Equipment Wholesalers' Association.*

The General Electric Co. is distributing to employees a booklet outlining the **traffic problem** of today and giving the steps it believes are necessary to improve safety on the road.*

The Aluminum Co. of America has completely revised its booklet entitled "Machining Aluminum" and has published the **new edition.***

Caterpillar Tractor Co. has issued a folder describing a number of **industrial uses** of its Diesel engines.*

Packless Metal Products Corp., Long Island City, N. Y., has issued a bulletin describing newly developed **self-flaring tube couplings.** It shows the method of use and includes tables of specifications.*

A **new book,** entitled "Studies in Current Tax Problems," has just been published by the Twentieth Century Fund, New York City.

* Obtainable from editorial department, AUTOMOTIVE INDUSTRIES. Address Chestnut and 56th Sts., Philadelphia.

Labor Rehired in September

Labor turnover trends in September in the automobile, automobile body and automobile parts fields were reversed from those indicated in August, according to the Department of Labor. The change was doubtless due to the reopening of production on 1938 model cars.

The total separation rate in the automobile and body plants fell to 6.82 per 100 employes from 22.16 in August, and compared with 4.57 in September last year. The total accession rate rose to 21.04 from 3.46 in August, against 20.35 in September, 1936. In the separation figure was a drop in the quit rate to 0.97 from 1.01 in August and 1.24 a year earlier, a rise in the discharge rate to 0.29 from 0.14 in August and 0.23 a year ago. The lay-off rate fell to 5.56 from 21.01 in August, against 3.10 in September, 1936.

In automobile parts the total separation rate fell to 4.19 in September from 8.27 in August, against 5.21 in September, 1936. The total accession rate rose to 12.15 from 5.61 in August, against 10.72 in September last year. In the separation rate the quit rate was 1.30 against 1.20 in August and 1.46 in September, 1936. The discharge rate was 0.26 against 0.27 and 0.39. The lay-off rate was down to 2.63 from 6.80 in August, compared with 3.36 in September, 1936.

Tire Prices Advanced

Following the Oct. 27 lead of the U. S. Rubber Company, major Akron tire manufacturers, including Goodyear, Goodrich, Firestone and General, made new and higher retail tire price lists effective Nov. 1, and simultaneously announced adjustments in dealer discounts and volume rebates, and commercial account discounts. Dealers and manufacturers benefit about equally from the higher prices.

Prices on third and fourth line tires are raised from 3 to 6 per cent under the new schedules with prices advanced only from 1 to 3 per cent on first and second line tires. Volume bonuses for dealers are widened. Whereas they ran from 1 to 10 per cent with the maximum of 10 per cent applying on an an-

(Turn to page 692, please)

Books

of automotive interest

The Art of Carburation, by Robert W. A. Brewer. Published by the Technical Press, Ltd., London.

This volume is a combination of two previous books by the same author, one of which bore the title of "Carburation" and the other that of "Carbureting and Manifolding." With the exception of an Introduction and possibly some of the Appendix material there does not seem to be anything new in the volume, and it is surprising that the author did not take advantage of the occasion to make a thorough revision of the text, which was certainly badly needed in view of the "remarkable

(Turn to page 691, please)

Lincoln Prices**

	1938 Prices	1937 Prices
136-in. Wheelbase		
Sedan, 5 pass., 2 window	$4900	$4450
Sedan, 5 pass., 3 window	4900	4450
LeBaron conv. roadster	5300	4950
LeBaron coupe	5300	4950
Brunn conv. victoria	5900	5550
Willoughby coupe, 5 pass.	5900	5550
145-in. Wheelbase		
Sedan, 7 pass.	5100	4750
Limousine, 7 pass.	5200	4850
LeBaron conv. sedan	5800	5450
LeBaron conv. sedan	6000	5650
*Brunn cabriolet	6900	6650
*Brunn cabriolet	7000	6750
*Brunn brougham	7000	6750
Brunn tour. cabriolet	7200	6950
Willoughby touring, 7 pass.	5900	5550
*Willoughby limousine	6200	5850
Willoughby sport sed., 5 pass.	7000	6850
*Willoughby panel brougham.	7400	7050
Judkins berline, 2 window	6000	5650
Judkins berline, 3 window	6100	5750
Judkins sedan, limousine	6300	5950

* $125 additional for fender well equipment except those types marked with an asterisk.

** All federal, state or local taxes and transportation charges are extra.

Calendar of Coming Events

DOMESTIC SHOWS

Boston, Mass., Automobile Show, Oct. 30-Nov. 6
Washington, D. C., Automobile Show, Oct. 30-Nov. 6
Los Angeles, Cal., Automobile Show, Oct. 30-Nov. 7
San Francisco, Automobile Show, Oct. 30-Nov. 6
Cincinnati Automobile Show.Oct. 31-Nov. 6
Altoona, Pa., Automobile Show....Nov. 2-6
Wilmington, Del., Automobile Show, Nov. 3-6
Akron Automobile Show.....Nov. 6-12
Brooklyn Automobile Show.....Nov. 6-13
Chicago Automobile Show.....Nov. 6-13
Columbus Automobile Show.....Nov. 6-12
Omaha Automobile Show.....Nov. 6-11
Detroit Automobile Show.....Nov. 6-13
Motor Truck Show, 4th Annual, Newark, N. J.....Nov. 6-12
Newark, N. J., Truck Show.....Nov. 6-12
Buffalo, N. Y., Automobile Show..Nov. 6-13
Indianapolis, Automobile Show..Nov. 11-20
Newark, N. J., Automobile Show..Nov. 6-13
Philadelphia Automobile Show....Nov. 6-13
Pittsburgh, Pa., Automobile Show.Nov. 6-13
Jersey City, N. J., Automobile Show, Nov. 8-13
Tri-State Automobile Show, Memphis, Tenn. .....Nov. 8-13
Baltimore, Md., Automobile Show, Nov. 13-20
Cleveland, Ohio, Automobile Show, Nov. 13-20
Rochester, Automobile Show.....Nov. 13-20
Springfield, Mass., Automobile Show, Nov. 14-20
St. Louis, Mo., Automobile Show.Nov. 14-21
Portland, Ore., Automobile Show.Nov. 14-21
Denver, Colo., Automobile Show, Nov. 15-20
Milwaukee, Wis., Automobile Show, Nov. 17-24
Kansas City, Mo., Automobile Show, Nov. 27-Dec. 4
A.S.I. Show, Navy Pier, Chicago, Dec. 6-Dec. 11

FOREIGN SHOWS

Italy, 10th International Automobile Salon, Milan .....Oct. 28-Nov. 8
Great Britain, 13th International Commercial Automobile Exposition (trucks and buses), London...Nov. 4-13
Toronto, Ont., Automobile Show..Nov. 6-13
Great Britain, 36th Scottish International Automobile Exposition, Glasgow .....Nov. 12-20
Montreal, Que., Automobile Show, Nov. 20-27
Peru, Automobile Show, Lima, Dec. 23-Jan. 6, 1938

CONVENTIONS AND MEETINGS

American Petroleum Institute, 18th Annual Meeting, Stevens Hotel, Chicago .....Nov. 8-12
SAE Regional Transportation and Maintenance Meeting, Newark, N. J. .....Nov. 9-10
International Acetylene Association, Annual Convention, Birmingham, Ala. .....Nov. 10-12
American Automobile Assoc., Annual Convention, New York.....Nov. 19-20
American Standards Association, Annual Meeting, New York City....Dec. 1
American Society of Mechanical Engineers, New York .....Dec. 6-10
SAE National Production Meeting, Flint, Mich. .....Dec. 8-10
SAE Annual Meeting, Detroit, Jan. 10-14, 1938
American Road Builders' Association, Cleveland .....Jan. 17-21, 1938
American Society for Testing Materials, Spring Regional meeting, Rochester, N. Y.....Mar. 7, 1938

Just Among Ourselves

Corporation "Sponsorship" Bid for Volume

WITHIN the General Motors and Chrysler organizations, competition between sales divisions, has often been used effectively as a means of putting the organization on its toes; of keeping one divisional group from feeling that the corporation existed because of or for it alone.

Some of the by-play incident to this practice has not always been evident to the public. But beginning with the 1938 model season, General Motors management has undertaken to "sponsor" a big Chevrolet push with the stockholders and the public.

A statement mailed to every stockholder over the signature of Alfred P. Sloan, Jr., says, in part:

"What Chevrolet does in any given year is of vital importance, not only to General Motors and the Chevrolet division, its dealers and retail salesmen, but also to business in general, for Chevrolet's operations are so large and extensive as to have a marked influence on the welfare and lives of millions."

Because of Chevrolet's peculiar competitive position, we feel that this move on the part of the corporation's management may turn out to be one of the shrewdest broad merchandising moves in many years. More than any other GM division Chevrolet, in depending on sheer volume and maintenance of first position on volume among all cars, carries with it an inertia which results in still more sales. Corporation "sponsorship," in conjunction with a flying start productionwise may put the Chevrolet division ahead far enough to maintain a sales lead for many months. Corporate concentration on Chevrolet sales will harm other GM division less than a similar move would hurt at least one of GM's competitors. While it is possible to overestimate the effect of a move such as we are talking about, we feel that this one was well timed, with respect to this year's market and also as to the year for its introduction. It will be interesting to see where Chevrolet stands, three months and a year from now.

A Little More or a Little Less

THERE seems to be no fine line of division between optimism and pessimism in talking about next year's sales prospects for the motor vehicle industry. One widely circulated estimate of production prospects for the coming year calls for 5,700,000 vehicles. Such an estimate, as far as we are concerned, could only be arrived at by confusing or interchanging plus and minus signs.

Most of the sales executives we have talked to, and they are not known as a pessimistic race, feel privately that if the industry comes to the end of the 1938 model season with a sold-out production which is only 5 per cent under this year's approximately 5,110,000, everything will be extremely hunky dory, or however you spell it.

A particularly competent statistician sees 1938 in terms of 10 to 12 per cent under 1937 (the model year, in terms of production). And, gentlemen, what we would like to get across here is that such figuring is *not* pessimism.

On such a basis most companies will profit in 1938, and because of stabilization of various cost factors may profit relatively more on slightly smaller volume, unless it should bring some of them too near the break-even point.

Enough In Sight For Healthy Profits

WASHINGTON observers insist that general business will move generally "sideways" for several months of 1938, with small up and down movements affecting particular industries. Many stock brokers expect that the generally bearish tone of the last few weeks will produce a secondary bump sometime around the first of the year which may carry through until late in 1938.

If these things and no others were taken into account, it would be foolish to predict a sizable increase in next year's motor vehicle production. Taking them into account, and then planning that their effect shall be minimized, and that the industry shall maintain its proud position in advance of other industries, is true courage and optimism, and the industry is full of it.

As the year opens, two companies are making a big bid for a comeback, one is well on its way after a remarkable 1937 record, and a fourth is being banker-directed to conserve a large equity. Our optimism takes this form: We believe the 1938 season will produce enough business so that these four companies, and all others in the passenger car field, will show a healthy profit on the 1938 model season.

—H. H.

General Motors A

THIS IS THE NINETEENTH IN THE SERIES OF MONTHLY PRODUCTION FEATURES

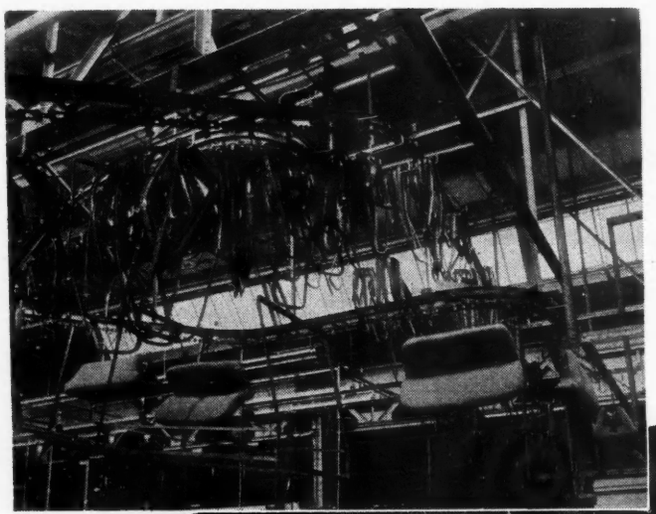
By P. M. Heldt

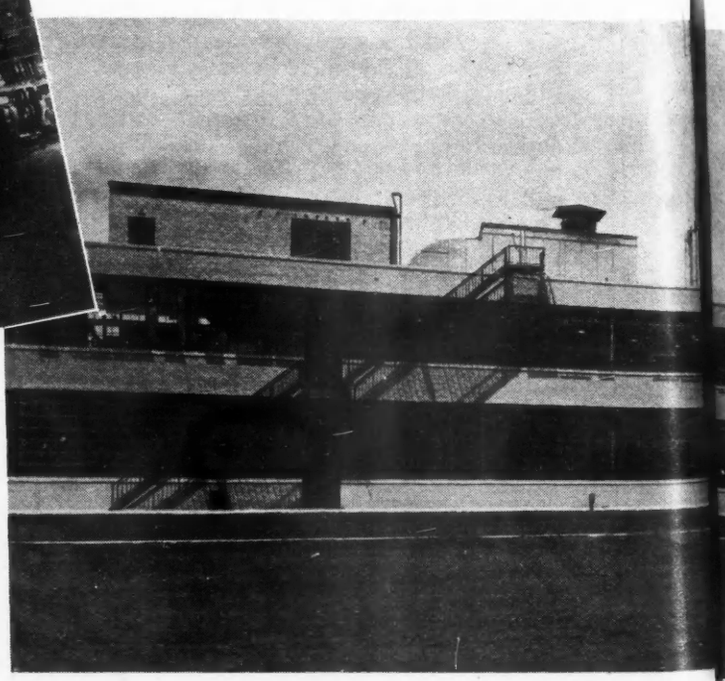
AN assembly plant for Buicks, Oldsmobiles and Pontiacs for the Eastern market was opened by General Motors Corporation at Linden, N. J., early in May last and has been in operation ever since. It has sufficient capacity to assemble 120,000 cars per year, and will supply dealers for the three lines located in the territory along the Atlantic seaboard approximately between the latitudes of Boston, Mass., and Washington, D. C. Up to the time of the writer's visit, early in October, more than 28,000 cars had been assembled and shipped.

All parts for assembly arrive at the plant by railroad, but assembled cars are shipped partly by railroad and partly by haulaway trucks over the highways. The plant has not yet been up to full capacity and deliveries have been confined for the most part to adjacent territory. From the standpoint of transportation facilities the plant is very favorably located, for its 78-acre site lies between the right of way of the P. R. R. Main Line and Route 25, one of the busiest arterial highways in the country, extending from Jersey City to Camden and forming the main highway route between New York and Philadelphia.

The establishment of an assembling plant at Linden was the result of a decision on the part of General Motors Corporation to decentralize its assembly operations. Up to a little over a year ago all three makes of cars were assembled at their parent plants in Michigan, but last year an assembling plant for the West Coast region was opened in Los Angeles, and this was followed by the Linden plant in May.

The Linden plant consists of four buildings, with a total floor area of approximately 900,000 sq. ft., and it also has an oval test track three-eighths of a mile in circumference. The buildings





At the top is a view showing various types of conveyors in use at the Linden, New Jersey, assembly plant of General Motors. The view directly above shows bodies being conveyed to the paint shop on the second floor, while at the right is a general view of the exterior

consist of the main factory, an office building, a loading dock, and a power house. All buildings are of modern steel, glass and brick construction, fireproof, well ventilated and well lighted. The main factory building is of the monitor type, 680 ft. wide and 1080 ft. long, of one- and two-story construction, and all chassis and body assembly operations are conducted in it. The office building, in front of the main factory building, is a two-story-and-basement structure and is 250 ft. wide by 45 ft. deep. The loading dock is 450 ft. long by 50 ft. wide, and the power house has floor dimensions of 100 by 125 ft.

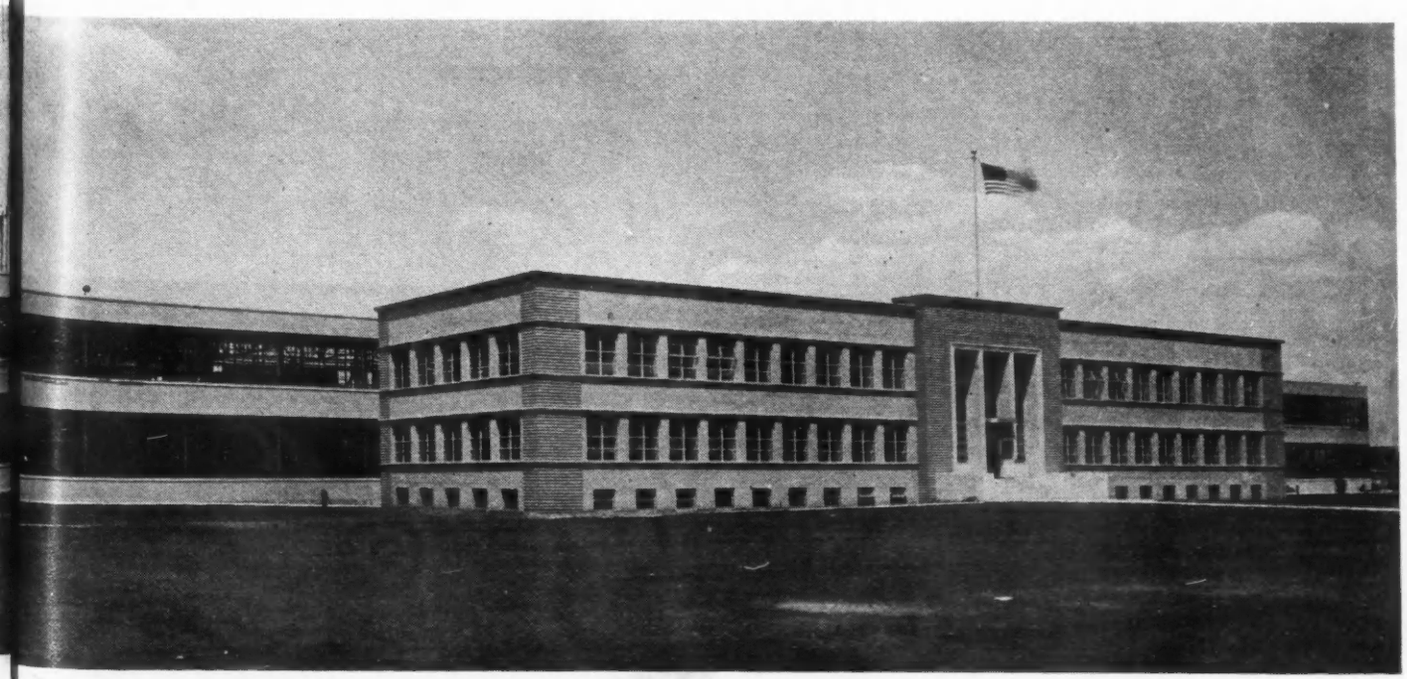
In the design and equipment of the Linden plant particular attention was paid to problems of safety and healthful conditions. All equipment was designed and installed in such a way as to prevent crowding of the men at their work. Pits on the assembly line are of sufficient height to permit those working in them to stand upright and to work in comfort.

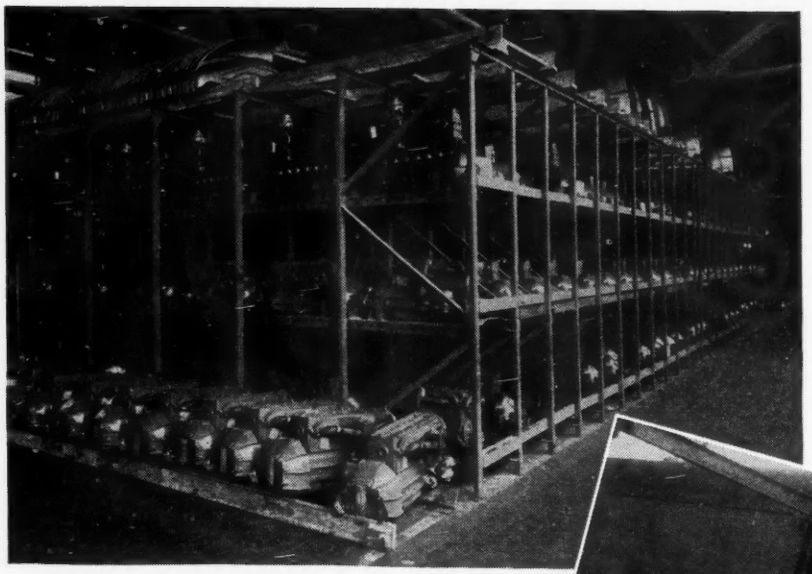
Linden Division forms a separate division of General Motors Corporation.

After the painted bodies have their glass and upholstery installed they are carried to the second floor on this conveyor for their electrical installations

Assembly Plant at Linden

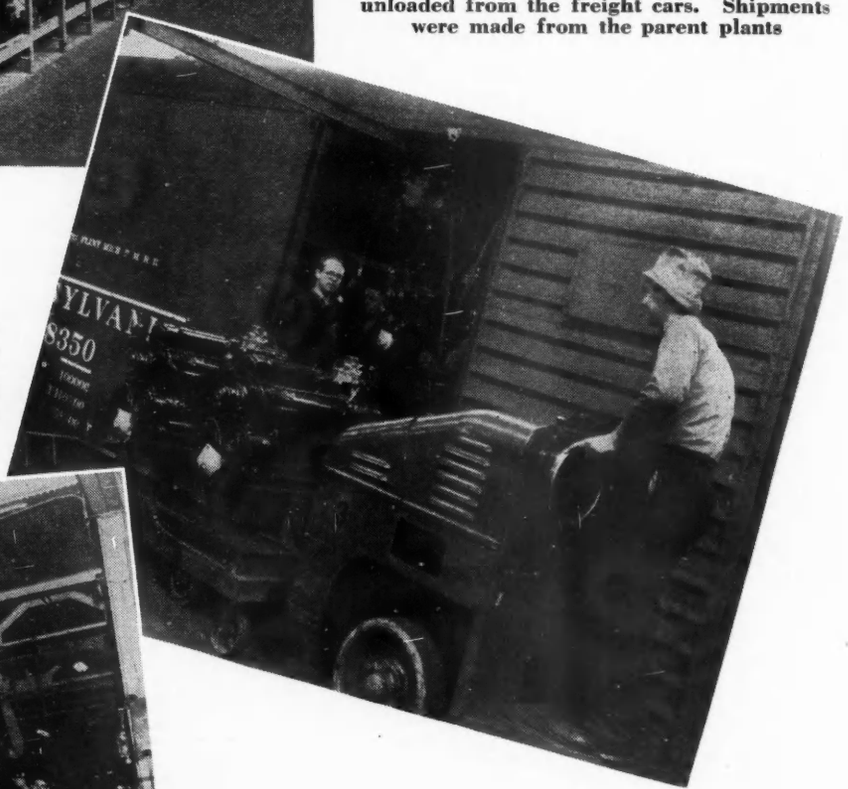
consists of four buildings with a total floor space of 900,000 sq. ft. It is designed to fill the needs of the Atlantic Seaboard from Boston to Washington



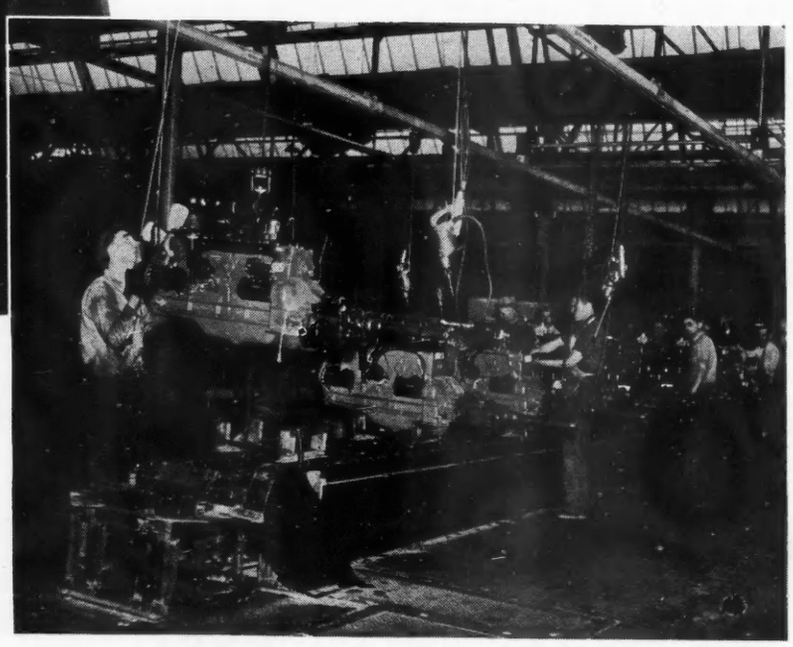


Storage room for Buick, Oldsmobile and Pontiac engines ready for installation is shown at the left

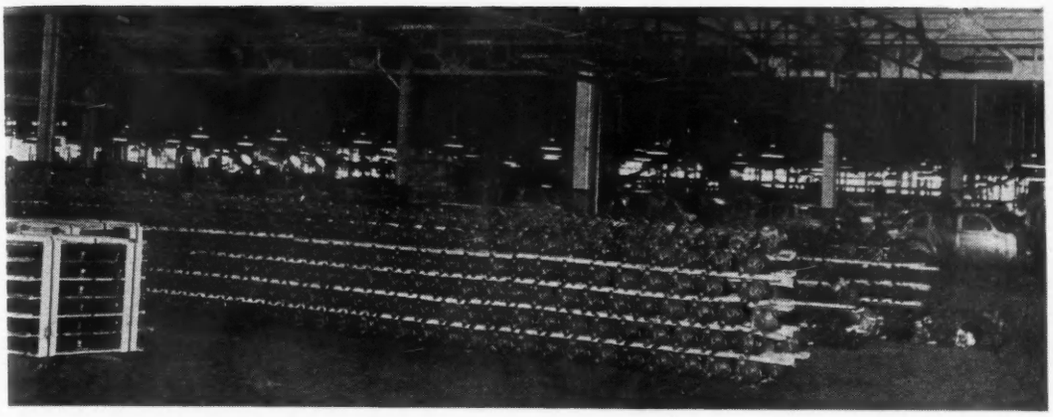
Directly below can be seen the engines being unloaded from the freight cars. Shipments were made from the parent plants



Nearing the end of the assembly line bodies are lowered on to the chassis as seen below. Although the engines are shipped to the Linden plant various parts must be added before they are ready to be mounted on the chassis



At the right the engines are moving up to meet the chassis



A store of transmissions ready for the assembly line

It receives its orders and its parts from other divisions of the corporation, and it delivers assembled cars to the Eastern dealers of these divisions.

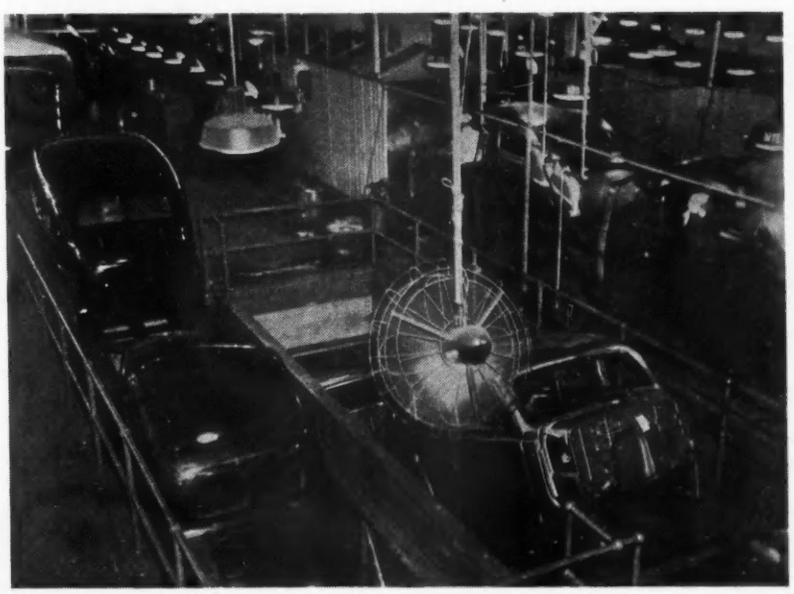
On first thought one would think that inasmuch as three different lines of cars are being assembled at this plant, an equal number of chassis-assembling lines would be required, as well as separate body and sub-assembly lines for the different makes. This, however, is not the case. All chassis are assembled on the same line, and bodies ditto. A Buick chassis may be followed by two Oldsmobiles and these in turn by one or more Pontiacs. Bodies, of course, must follow one another in the same order, so that a chassis and the corresponding body will always arrive together at the junction point, where the body is lowered from the upper floor onto the completely-assembled chassis below. This sequence or order on the assembling lines is determined by the sequence of orders for cars received at the plant. It can readily be imagined that with three different lines of cars to be assembled, each line with fourteen or more different models, proper timing and coordination is one of the most difficult of the problems that have to be faced.

Freight cars bringing parts to the plant are run directly into the main building. All chassis parts arrive at the eastern side of the building, all body parts on the western side. When the plant is running at capacity, about 400 cars are assembled per day, from which it may be judged that an enormous number of parts must be constantly kept in stock. Parts are stored in individual racks, which are arranged in the order in which the parts are used on the assembly line. Unloading of the freight cars and transfer of the parts to the racks is effected by means of industrial trucks and tractors. Heavier parts, such as engines, axles, etc., are handled by means of chain hoists and trolleys, while smaller parts are transported in standard-size corrugated steel bins. Some of the photographs reproduced herewith illustrate the method of unloading freight cars and the storing of engines and axles in racks.

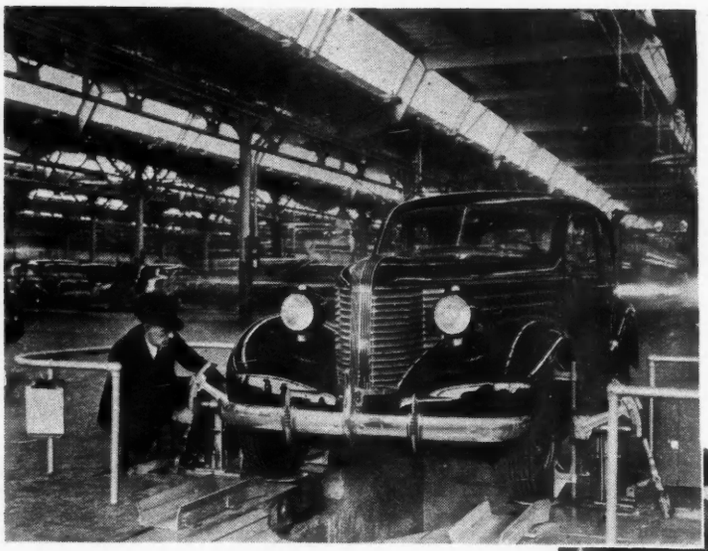
Body parts arrive in the assembling plant in the form of stampings which are assembled by welding in seven welding bucks all arranged in one line. It may be pointed out here that the Linden plant assembles only cars with closed bodies—none of the convertible type. Six of the seven welding bucks will take any body of any of the three lines, with the exception of coupes, which latter are welded in the seventh buck. In the welding buck the various panels are clamped in position and welded together. As many as six operators are working on a body in the welding buck at the same time, some on the inside and others on the outside. The welding operations include both torch welding and electric spot welding.

Welders are supplied with new-type eye and face hoods, which replace the old-type welder's goggles and insure protection for the entire face. These hoods are provided with shatter-proof glass fronts and cover the entire head and shoulders of the workman.

After having been worked on in the welding buck, the body is removed therefrom and placed on a conveyor truck, on which it remains until it has been completely assembled and finished, and is ready to be placed on the chassis. On the conveyor additional welding operations are performed, mainly to fasten small parts in place, such as those to which the upholstery is attached. These are spot-welding operations which are performed by portable

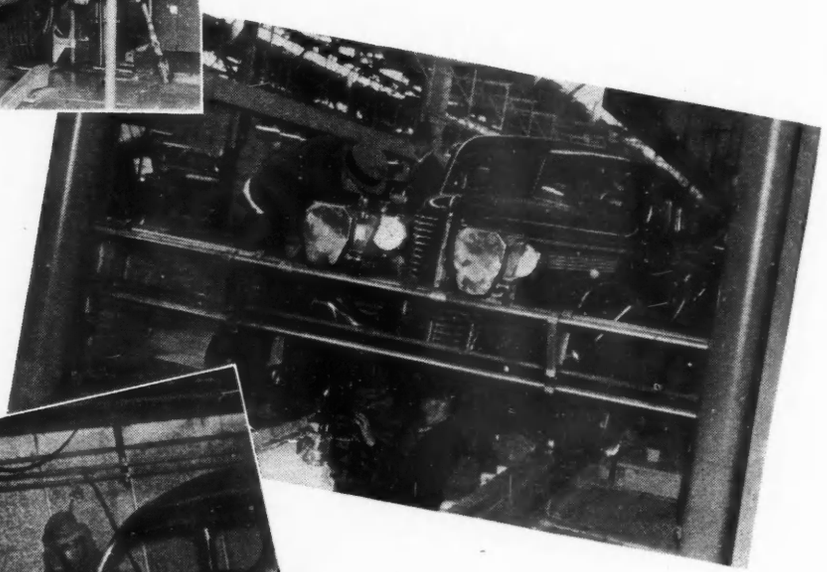


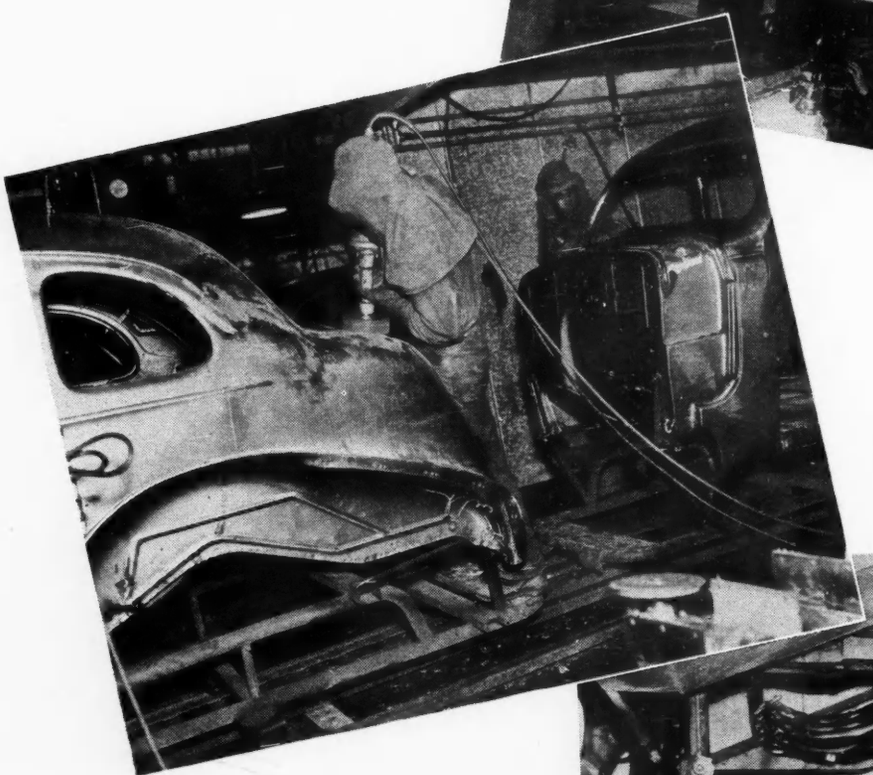
Two-way moving ramp carrying bodies to the paint shop and finished bodies to the electrical shop



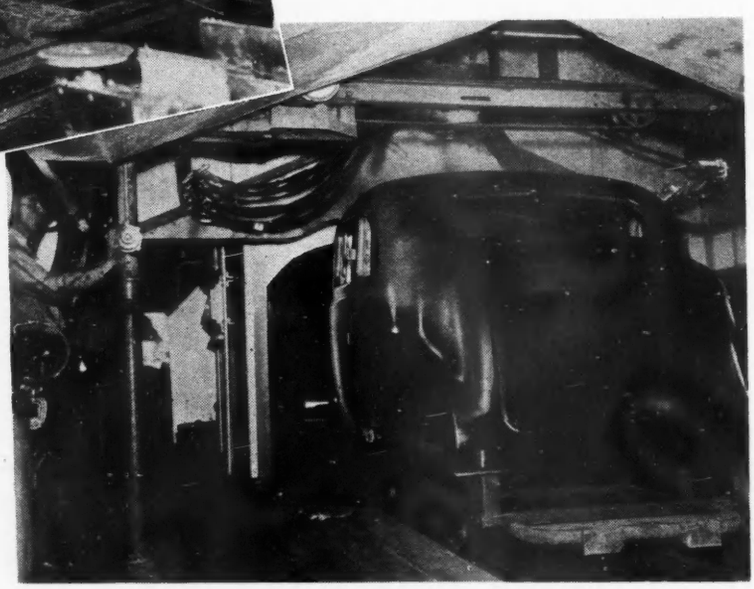
At the left the front wheel alignment is being tested. This is one of several tests made to insure a satisfactory performance

Adjusting the toe-in and headlights at the end of the assembly line is another of the operations made to make certain the good operation of the vehicle

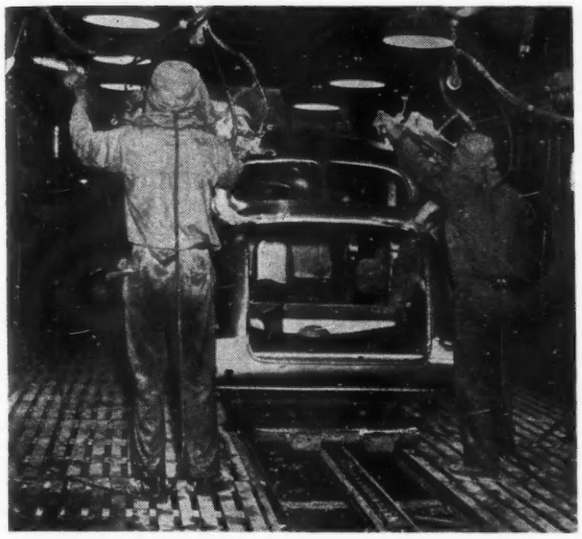




Below is a view of the paint shop. Here again the operator is well protected from the hazards of his position



Grinding operations on newly welded bodies are shown above. Note that every element of safety and comfort for the workers has been supplied. This is a feature of the whole layout at Linden



Another view of grinding operations on newly welded bodies

apparatus while the body is in motion on the conveyor.

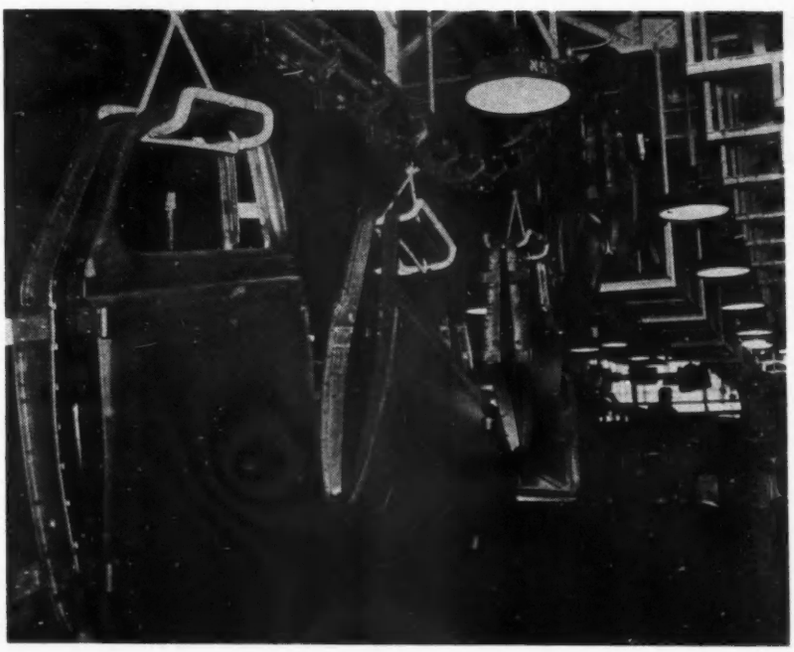
As soon as the body reaches the conveyor, grinding operations are begun on it, by means of electric portable grinders, to grind away the seams produced by welding. A number of these grinding operations are illustrated by photographs reproduced herewith. The body-assembling conveyor runs through the entire building a number of times. Toward the end of the second line the doors are put on the body, these arriving at that point on an overhead conveyor from which they are suspended. At this point also solder is applied to the body at the seams, which are then smoothened by grinding operations. At the end of this second line the windshield openings of the body assembly are gaged.

Illumination along the assembly lines is by mercury and Mazda lights, and practically all of the tools used in the assembling operations are of the electric portable hi-cycle type. All electric cables for these tools and for portable lights depend from points high up on pillars or walls, and do not lie on the floor, so the men cannot trip over them. The bodies now pass between two batteries of powerful incandescent electric lamps where they are inspected for blemishes. At this point all signs of seams should have disappeared from the outside of the bodies. Any blemishes discovered by the inspectors are indicated by chalk marks and are immediately removed, by means of rasps, files, emery cloth, etc.

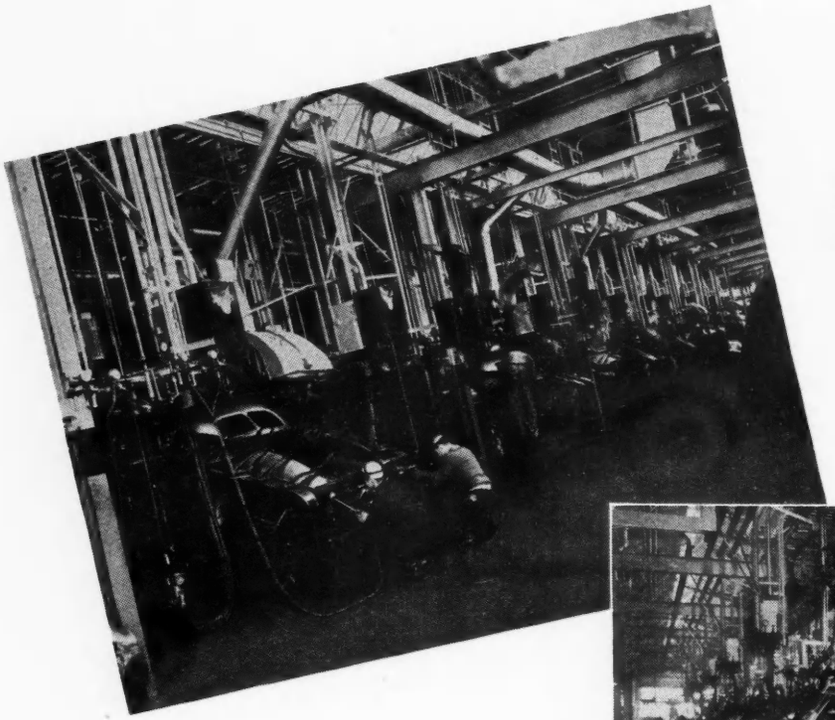
At this point wiring operations on the body begin, the wiring for the rear lights being put on first, and in the next operation the wiring is extended to the front. Every operation, by the way, is numbered, and the number of the operation is marked on a post or on the wall at the point where it is carried out. As the body moves along it is subjected to constant inspections.

Bodies now are carried by the conveyor to the second floor, where they are prepared for finishing operations. They are first washed with water, and then subjected to a blast of steam to remove oil and grime, and finally wiped dry. Wherever washing operations are going on there are water troughs along the conveyor on both sides. Next the bodies are given a primer coat which is applied by means of spray guns in a spray booth. In this spray booth the surplus spray and vapor-laden air are sucked off into a chimney by means of the ventilating system. After having received the priming coat the bodies pass through a drying oven which is maintained at approximately 275 deg. Fahr. They remain in the oven for 1½ hrs. and then emerge near the end of the building, where they are given a rub-down which prepares them for the application of the second primer coat. This second primer coat is applied in the same manner as the first and is also followed by a drying process in an oven and by a rub-down with sand paper. At the section of the line where the rubbing-down operation is performed there are closely-spaced mercury lamps at both sides, so as to avoid shadows and enable the men to inspect all parts of the bodies closely. Any faults are corrected at the end of the rub-down section after the second primer coat.

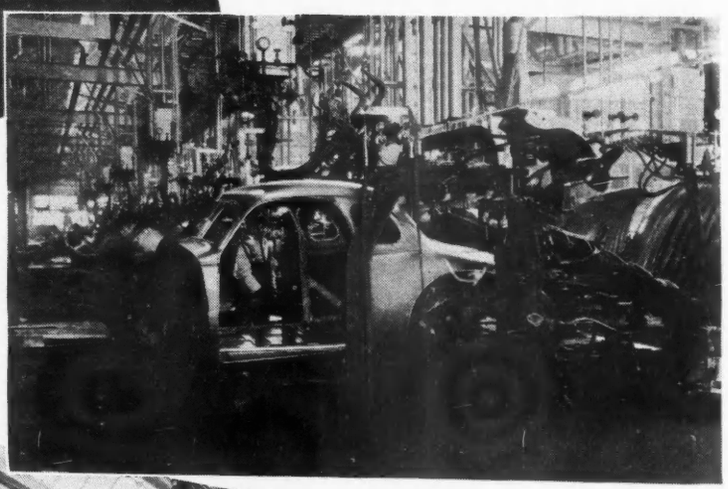
As the bodies have to remain in the oven for an hour and a half, it was evidently impractical to include this oven in the conveyor line. Actually there are six passages through the oven and bodies on the conveyor trucks, as they come off the conveyor, are distributed between three of these. The trucks are hauled out of the far end of the oven by hand, and to protect the workmen from the hot air that tends to leave the open end of the oven, a current of cold air is directed against each of the six outlets, through a pipe manifold, as



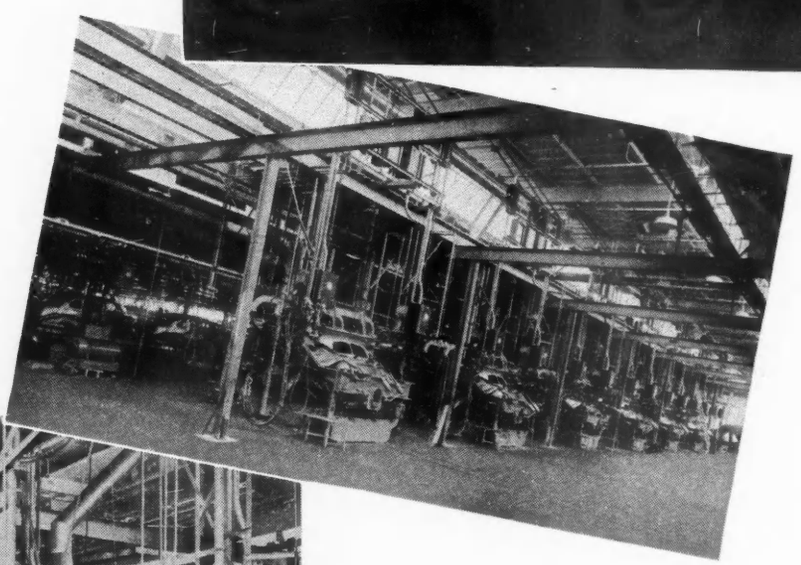
Conveyors carrying the doors for assembly plant operation

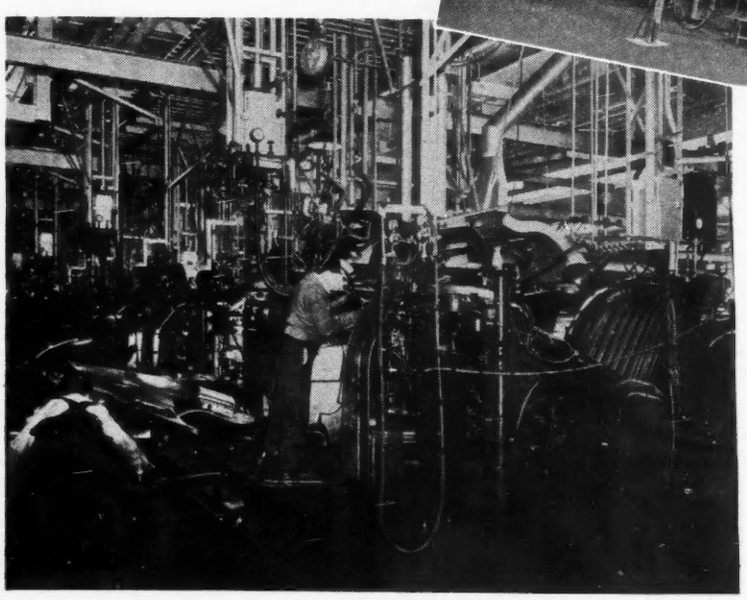


At left: Line of seven welding bucks in which the body panels, turret top and steel floor are welded together. Below: The one welding buck used for welding up coupe bodies.

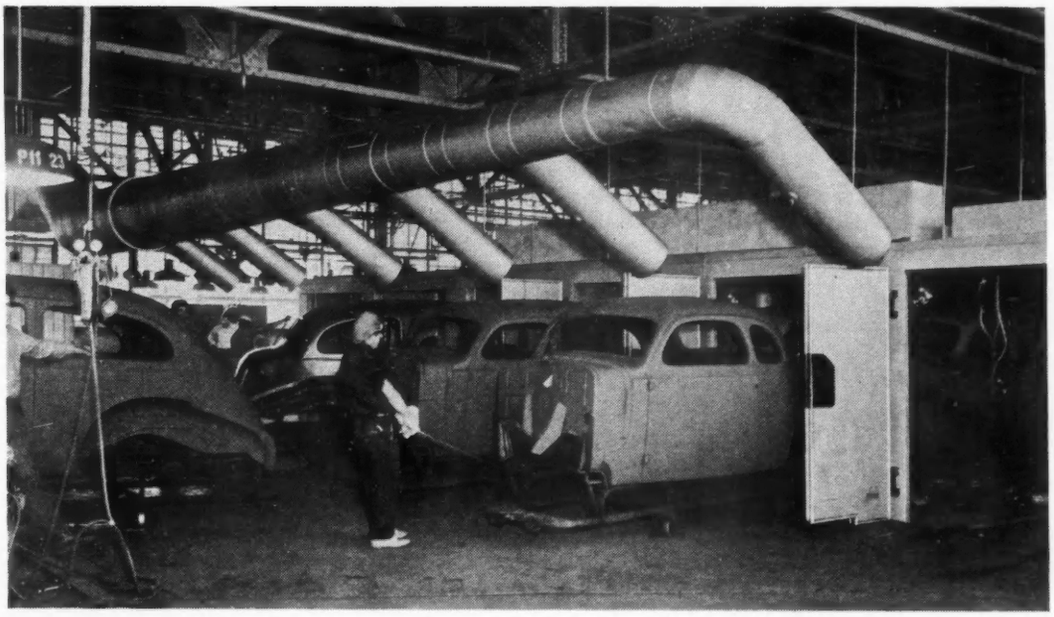


At lower right: Another view of the line of welding bucks. In the background are seen a number of bodies on the conveyor, where further welding is done on them.





At left: Showing welders at work on the body in the buck. At the left in the photograph is shown the conveyor truck on which the body is mounted after it leaves the welding buck.



Bodies after the primer coat of paint emerging from the baking ovens

shown in one of the photographs. After the second primer coat has been applied the bodies return through the remaining three "lanes" of the drying oven.

Up to this point all of the bodies have come over the same line. Now a tag is attached to each body which contains all of the color specifications for the particular car. The paper tags are placed inside of sheet-metal holders which are attached to the bodies with chains.

At this point, also, there is stationed a checker who notes whether the bodies are arriving there in the predetermined order or whether the order has been changed, perhaps because one of the bodies had to be taken out of the line to have special work done upon it. He is equipped with a telautograph by means of which he makes a report to headquarters. There is a similar checking station at the end of the body-assembly line, where the bodies are lowered to the ground floor.

At the beginning of the color line the bodies are blown off with an air jet to remove any dust that may have settled on them. Color coats, of course, are also applied by means of spray guns. In each of the spray booths in which color coats are applied there are a considerable number of spray guns, each of which is piped to a source of supply of a particular color. After the first color coat has been applied the body passes through a short drying oven, and it is then inspected for imperfections in this color coat, which is a dull coat. In this inspection section of the line there is also very intense illumination, with batteries of lamps on both sides. Next the first finishing coat, a lustrous coat, is put on and this again is followed by passage through a drying oven.

While the sides and back of the body have the color coats applied with spray guns manipulated by the workmen, the turret tops are sprayed by means of a mechanical arrangement. Two downwardly-pointed spray guns are moved back and forth across the turret top by means of a belted mechanism while the body passes underneath on the conveyor. Application of the final finishing coat is followed by the final drying, which is accomplished at a temperature of 170 deg. Fahr.

Next the bodies are taken to the lower floor on the conveyor and are there polished by means of portable electric polishing wheels. At this point also the application of interior fitting begins with the dashboard, which is put in place while the ouside of the body is being polished. This is followed by the cementing in position of an insulating plate for the floor, and following this the window glasses, the upholstery, interior trim and windshield are put in position. Following this the body is once more taken to the upper floor, where the wiring harness, the door handles, the back fenders, tail lights and other fittings are put on.

Chassis assembly begins with the chassis frame, which is put on a chain conveyor right side up and first of all has the step hangers attached and the piping for the hydraulic brakes installed. Such other parts of the braking system as the pedal and the master cylinder are put in place next. Other parts secured to the frame here are the rubber mounting blocks for the engine, the rear shock absorbers, and a clip for the fuel-tank filler.

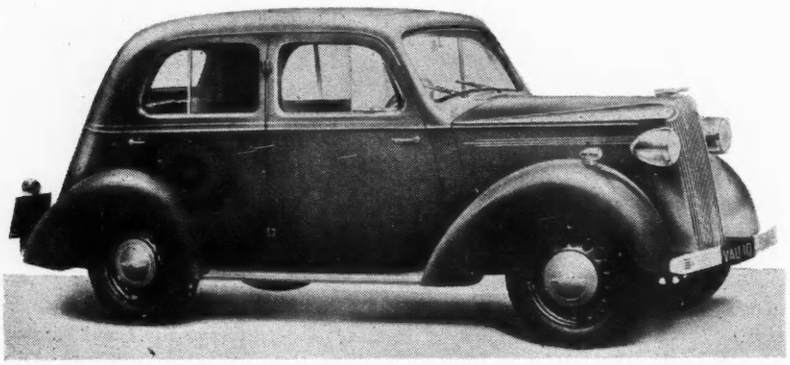
At this point the frame is turned up side down so as to make it easier for the workmen to put on parts that are located below the frame or secured to its under side, such as the front torsion bar, rear sway bar, rear springs, rear shock absorbers, etc. From here on a group of workmen works at each end of the chassis, which lies across the conveyor. With the frame in this position the steering gear, rear axle, fuel tank and exhaust pipe are put in place. Most of these operations, of course, are bolting operations, and screws and nuts are driven home by means of electric tools.

Next the chassis is raised by means of a hoist, reversed, and put onto another conveyor in the longitudinal direction. In this position the fuel line, which extends from the rear tank to the fuel pump in the engine compartment, is put in place, and the shock absorbers also are put on. Next to be placed in position is the engine, which arrives over a side conveyor line and is lowered into position on the chassis by a chain hoist. While engines arrive at the plant completely assembled, all accessories, such as generator, starter, carburetor, ignition unit, etc., are assembled to them at the Linden plant. When the engine is being lowered the filler plates between the crankcase and the frame side rails are already in position. After the engine is in place the muffler is put on, then the battery, and the cables to the starter and to ground are put in place. Other components are put in place in the following order: Steering post, running board with antenna underneath it, body-mounting pads, front fenders and their aprons, radiator and radiator guard, and lamps, which latter are assembled on a side line and here placed in position on the chassis.

Next the front assembly, with wheels and tires, is put in place. Here one can

(Turn to page 693, please)

London Show at Earls Court...



New Ten-Four Vauxhall sedan which has a unit construction of chassis and body.

By M. W. Bourdon

FOR the first time since 1904 the name "Olympia" is not associated with London's passenger-car show. This year the scene is the new Earls Court, an immense reinforced concrete building that has been erected on a triangular plot, partly over six underground railroad tracks. The building, also triangular in plan, consists of a ground floor with a rectangular central area extending on two sides far under triangular galleries in which accessories and parts are exhibited.

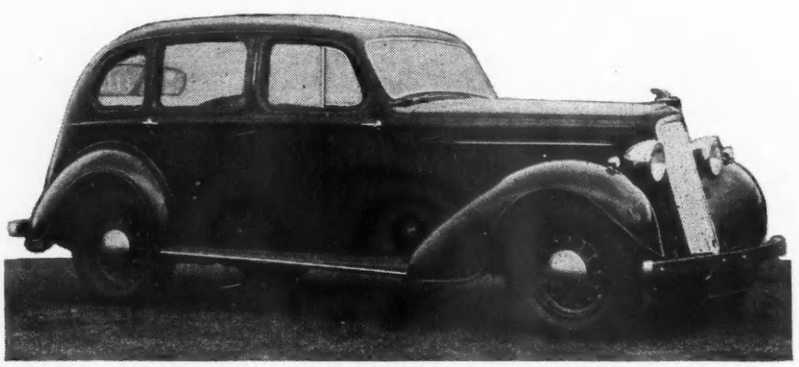
In the central section are staged the car exhibits; under the galleries are motor boats, house trailers, marine engines, garage and servicing equipment and custom bodies, while in the galleries are accessories and components. The floor area of the building permits each exhibitor to have more space than at Olympia; the size of the majority of the car stands is 62 ft. x 22 ft., but Morris and Austin, England's two biggest producers, have stands of twice that size, viz., 62 x 44 ft.

Earls Court is far more suitable for the show than the conglomeration of halls and galleries at Olympia. It is more conveniently reached by Underground (10 minutes from Piccadilly); the exhibits are displayed to better advantage; the all-artificial lighting is more effective; it is air-conditioned, and there is parking for 2000 cars and more appropriate provision for catering in restaurants seating 4000 people. An innovation so far as the London show is concerned is the uniform banner signs on the ground floor, the various sections being distinguished by different colors.

There are 58 makes of cars on view, apart from the 33 exhibits of body builders (550 cars in all). American makes represented are Buick, Cadillac, Chevrolet, Chrysler, Cord, Dodge, Graham, Hudson, La Salle, Lincoln, Nash, Oldsmobile, Packard, Pontiac, Studebaker, Terraplane and Willys. There are also the Lammas Graham and the Railton Hudson, which comprise various American components and British bodywork. In the marine section there are 42 exhibitors, 14 in the house-trailer section. Service and garage equipment is shown on 67 stands, accessories and parts are on 279. Twelve tire makers are exhibiting.

In April and May last it was freely predicted that there would be very few new models at this year's show, owing to the intense shortage of materials and skilled labor brought about by the Government's rearmament program. But the prophets proved to have been wrong. By hook or crook those car manufacturers who had new designs ready for production were able to obtain the essential new manufacturing equipment. Costs have been high, undoubtedly, but evidently they were not prohibitive.

A general increase in car prices, probably 20 per cent, was also forecast earlier in the year. But this forecast also proved unduly pessimistic. True, some manufacturers have put up their prices, but there are more with prices practically unchanged, while in some instance big reductions have been made. In the latter category are the Lanchester Eighteen and Eleven, respectively £70 and £23 cheaper (about 12 and 6 per cent); Humber has two new models which, compared with su-



New 21 hp. Humber "Snipe" five-passenger sedan. 80-85 m.p.h. maximum speed; acceleration 10-30 m.p.h. in 7.5 sec.

arouses British interest with exhibits by 58 automobile manufacturers. Design changes greater than forecasted. Prices remain practically unchanged

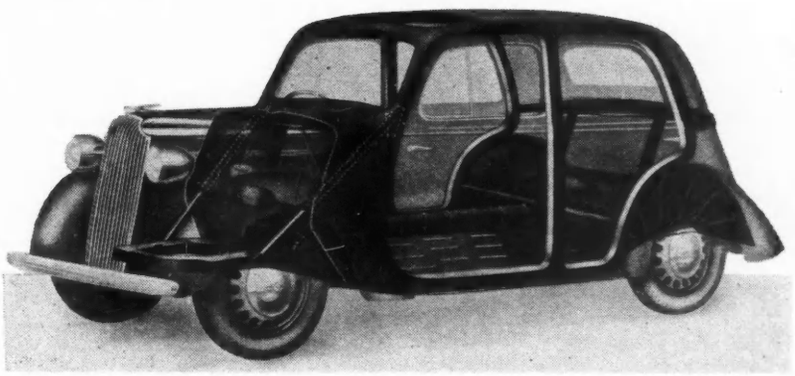
perseded types, are approximately £100 less (about 20 per cent); Alvis has a new 20 hp. Six which at £595 is £150 less than any other Alvis of its type ever offered; Standard put a small increase into force in May, but has since put reductions into effect making the prices lower in some cases than before the May increase. Morris and Austin prices, on the other hand, are a little higher.

In view of the fact that independent front suspension is almost universal on French, German and Italian cars, and so extensively applied to American makes, it is worthy of note that this feature is still cause for remark in British practice. True, there are additions to the list of British makers producing one or more models with independent front springing; Daimler and the associated Lanchester, and Talbot are using it on one model each for the first time. Wolseley — a Morris subsidiary—on four new models claims to have developed the conventional half-elliptic system so it provides the benefits of independent springing with none of the drawbacks and has applied the term "phased suspension" to it. The explanation offered for its action is not so convincing as the behavior of the cars on the road, for the latter certainly are unusually stable.

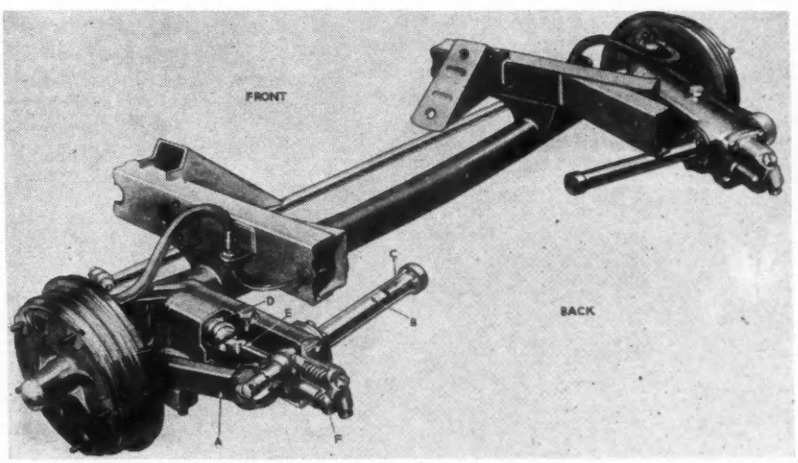
Vauxhall, in entering the small car field for the first time, has applied to a 10 hp. four-cylinder model the torsion-bar and torsion-tube system of independent front suspension fitted last year to the "25" and of which an illustration is shown below on this page.

This new Vauxhall Ten is distinctive among British products in having a unit-built chassis and body. The latter as a whole constitutes an arched girder running from front to rear with a box-section front extension or forecarriage supporting the powerplant, the axle beam, radiator and steering; diagonal tubular stays brace this extension to the bottom of the windshield pillars, passing up through the cowl. The rear half-elliptic springs are shackled to the body, the sills of the latter displacing the usual side rails of a chassis.

The engine has 2.5 by 3.74 in. cylinders (73.4 cu. in.), pushrod valve operation, and a compression ratio of 6.5; it develops 34.5 b.h.p. at 3800 r.p.m. Other engine details are oval-ground aluminum pistons, a three-bearing, counterweighted crankshaft, silicon-chromium valves, forced lubrication with jets of oil



Shadow view of new Ten - Four Vauxhall showing unit construction of chassis and body shell.



Cut-away view of front torsion bar and tube suspension of Vauxhall Ten and Twenty-five.

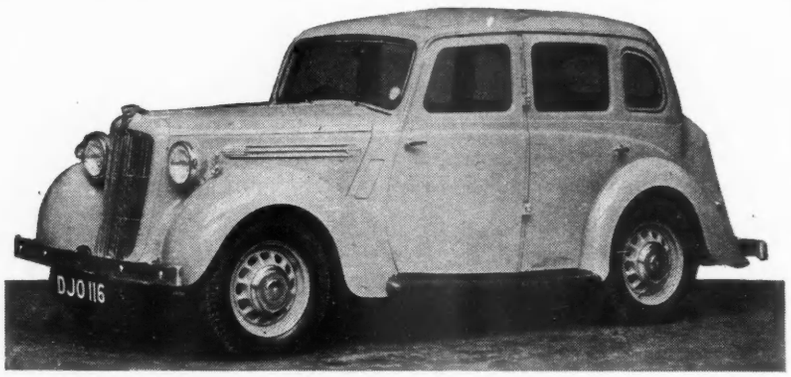
The wheel is fixed to the wheel carrier arm (A). When this arm rises or falls with the movements of the wheel, it twists the torsion bar and tube (C and B). This part of the suspension is designed to take maximum shocks. On good roads, the coil spring (D) bearing upon the toggle (E) helps the wheel to twist the bar and tube. It will be realised that the full effect of this spring is felt while the wheel movements are relatively slight. When bad surfaces have to be negotiated, the toggle moves further away from dead centre, and the power exerted by the spring (and therefore the assistance it can render) becomes progressively less, thus stiffening the suspension. F is a double-acting shock absorber.

from the connecting-rod heads, to the cylinder walls, a down-draft carburetor with accelerating pump, and economizer, interconnected strangler and throttle, thermostatic choke control, thermostatically-controlled exhaust heating and centrifugal and vacuum ignition timing.

The transmission includes a three-speed synchromesh gearset and spiral bevel final drive (5.14 to 1). Brakes are Lockheed hydraulic, wheels of the spoked-disc variety, and tires 4.50 in. x 17 in. medium pressure. The wheelbase is 94 in.; the track, 46⅛ in. front and 47 in. rear; ground clearance, 7½ in., and the weight of the standard sedan just over 2000 lb. At present only the sedan is offered, but in January there will also be a coupe.

This new Vauxhall is an attractive proposition to British eyes, in specification, appearance and price, the latter being £168 for the standard sedan or £182 for the deluxe version with sliding roof, no-draft ventilation and leather upholstery (in place of leather cloth). As regards performance, the makers claim a maximum of 60-65 m.p.h., acceleration in high gear from 10 to 30 m.p.h. in 10.5 seconds, and an average fuel mileage of 40 to the Imperial gallon. It is said that £1,000,000 has been spent on plant extensions and equipment to produce this new model.

The six-cylinder Vauxhall "25" has not been changed materially but an all-synchromesh three-speed gear set has been substituted for the four-speed with synchromesh on third and high, and articulated metal shoes are now being fitted to the rear half-elliptic springs. The price of the five-passenger sedan has been increased from £298 to £315. An innovation in British practice is an air-heating, ventilating and defrosting system.



New Morris Twelve-Four sedan, Series III with overhead valve 91½ cu. in. engine.

Morris has a new range of models known as Series III which differ from the Series II in having overhead-valve engines. The smallest model (8 hp.) still has side valves and, like the largest, the 25 hp. Six, has a three-speed gearset, whereas the Ten and Twelve-Fours and the Fourteen-Six have four speeds. There is new body styling on the Twelve and Twenty-five, the sedans having an extending rear locker for luggage; on the Twelve there is a second, shallow locker below the other for the spare wheel. This dual locker arrangement is found on several British cars for 1938, and in many other cases the spare wheel is now enclosed instead of being recessed in the rear panel, or locker door, with a sheet metal cover.

The built-in hydraulic four-wheel jacking system of the Morris now is standard only on the Twenty-five, being £5 extra on other models. Built-in jacking has receded, its place being taken by what is termed "four-corner jacking," which implies a "loose" jack—hydraulic or mechanical—for application to special abutments on strengthened bumper brackets.

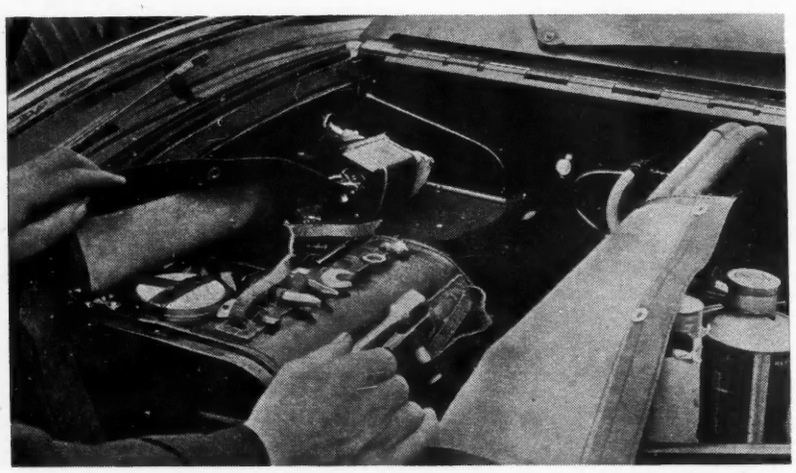
Austin has one additional model and another of new design displacing a previous type. The additional model is known as the Big Seven; it has a longer wheelbase and wider track than the Seven (which is continued), an engine of greater piston displacement though of the same tax rating, and a four-door sedan body in place of the two-door.

Comparative dimensions are as follow:

	Piston displacement	B. Hp.	Wheelbase	Track Front	Track Rear
Seven	45.5 cu. in.	17	81 in.	40 in.	43 in.
Big seven	54.9 cu. in.	25	87½ in.	43 in.	45 in.

Both engines have a three-bearing counterweighted crankshaft, anodized aluminum pistons, three-point rubber mounting, aluminum head and side valves. Both models have a four-speed gearset with synchromesh on second, third and fourth, helical bevel drive, Girling mechanical brakes and the original Seven suspension, viz., transverse in front and quarter-elliptics at the rear. The sedan price now is £128 for the Seven and £155 for the Big Seven.

The other new Austin is an Eighteen-Six. With a wheelbase of 123 in. and 58½ in. track, the chassis is intended primarily for seven-passenger bodywork, of which two styles are standardized, one with a drop glass division behind the driving seat and the other without this feature. The L-head engine, which has a piston displacement of 153 cu. in. and a four-bearing crankshaft, is set 9 in. farther forward in



On Wolseley Super-Sixes the tool kit, windshield-wiper motor and electromagnetic fuel pump are accomodated in the space between the dashboard and a "fume-proof," heat-insulating bulkhead behind the engine.

the chassis than in the superseded Eighteen. It is flexibly mounted on two widely-spaced points at the front and two close together at the rear of the unit gearset, which has four speeds, three with synchromesh. A feature of the transmission is that from the gearset a coupling shaft with front universal joint runs back to the open propeller shaft; the coupling shaft is supported at the rear by a ball bearing in a rubber housing carried by a bridge piece attached to the cross-bracing of the chassis.

Half-elliptic springs of low periodicity are used at front and rear, with zinc interleaving and oilite pads between the main leaves. Spring lubrication is distinctive. Each spring platform is drilled diagonally from below, the hole at its upper end coinciding with the center of the spring, the leaves of which have grooves leading forward and backward. Lubricant is delivered to these grooves through an oil-gun nipple below the spring platform. Brakes are Girling mechanical, with pistol-grip hand lever under the cowl. Steering is of the Marles-Weller cam type, with track rod in front of the axle. Final drive is by helical bevel (5.11 to 1).

The body of this new Austin is a six-light four-door type, with doors 31 in. wide; there is an extending rear locker with suit cases included, safety glass throughout, hide upholstery, built-in hydraulic jacking, sliding rear-quarter lights and foot-operated dip-and-switch headlights. Prices range from £350 to £383.

The increase in size of four-cylinder engines noted last year and the year before has continued. Last year the maximum piston displacement of Fours was just under 120 cu. in.; at Earls Court there are British and European cars exceeding that limit, a new 16-hp. Riley being the largest with an engine of 150 cu. in. developing 80 b.hp.

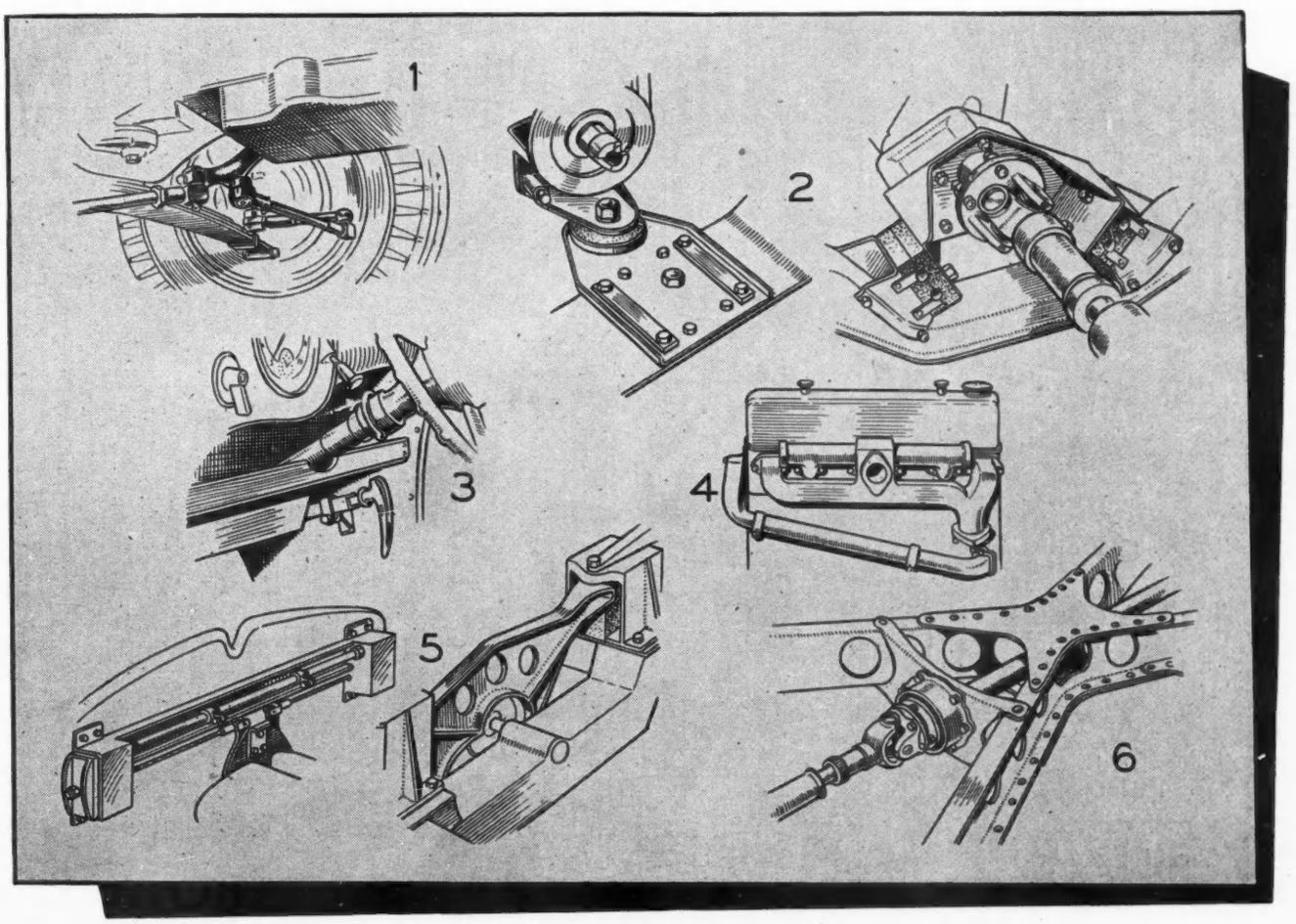
Like other Riley engines for ten years or more, the Big Four has valves on opposite sides of the cylinder head, pushrod-operated from two camshafts in the crankcase. The power unit is flexibly mounted on rubber, with torque reaction dealt with separately. There is a double mounting point at the front end and a single one at the rear. Fore-and-aft location is effected by rubber-loaded tie-rods running longitudinally forward from a central cross-member, while torque reaction is met by lateral rubber-loaded tie-rods coupled to the rear end of the cylinder block and attached to the dashboard unit.

This and certain other models of the Riley range are unique in British practice in having a three-speed gearset with an overdrive (Warner Gear). On

(Turn to page 686, please)

Design Details at London Show

1. Hillman independent steering with drop-arm coupled directly to swivel axle levers. 2. Front and rear engine mountings of new Humber Sixes. 3. Pistol grip (pull on) brake lever of Standard cars and, indicated by white arrow, curved locking lever of extensible steering column. 4. Morris Twelve-Four overhead valve engine with additional exterior water connection between front of cylinder block and rear of cylinder head. 5. Riley Big Four front end mounting of engine and (on left) rubber-loaded tie-rod system on dash coupled to rear end of cylinder block. 6. Front end of propeller shaft of new Austin Eighteen and rubber-mounted bearing of rear end of coupling shaft.



Hercules Motors Building Four-Cylinder Diesels

HERCULES MOTORS CORPORATION, which heretofore has built Diesel engines in six-cylinder form only, has added three sizes of smaller, four-cylinder Diesels known as the DOO series, for use in commercial vehicles of smaller size and for industrial, agricultural, oil-field and marine applications. The smallest of the three members of this series, the DOOB has cylinder dimensions of 3¾ by 4½ in. and a total displacement of 198.8 cu. in. Next comes the DOOC, with 4 by 4½ in. bore and stroke and a displacement of 226.2 cu. in., and the largest is the DOOD, with 4¼ by 4½ in. cylinders and a displacement of 255 cu. in. The three engines are rated 62 hp. at 2600 r.p.m., 70 hp. at 2600 r.p.m. and 56.5 hp. at 1600 r.p.m. respectively.

Engines of the new series are interchangeable, from an installation standpoint, with the Hercules OO series of gasoline engines, which enables manufacturers of motorized equipment to supply either gasoline or Diesel engines without running up against installation difficulties. This same practice is followed by Hercules in connection with its six-cylinder engines.

In general design the DOO series embodies the same principles as the larger engines. The four-cylinder models also have the auxiliary combustion chamber at the side of the cylinder, which was developed and patented by Hercules. The throat which connects the cylinder with the chamber is so designed that the piston as it approaches the end of the compression stroke gradually reduces the effective throat area, thereby automatically increasing the velocity at which air enters the chamber at the time fuel is injected into it. This, of course, tends to improve the distribution of the fuel in the air charge.

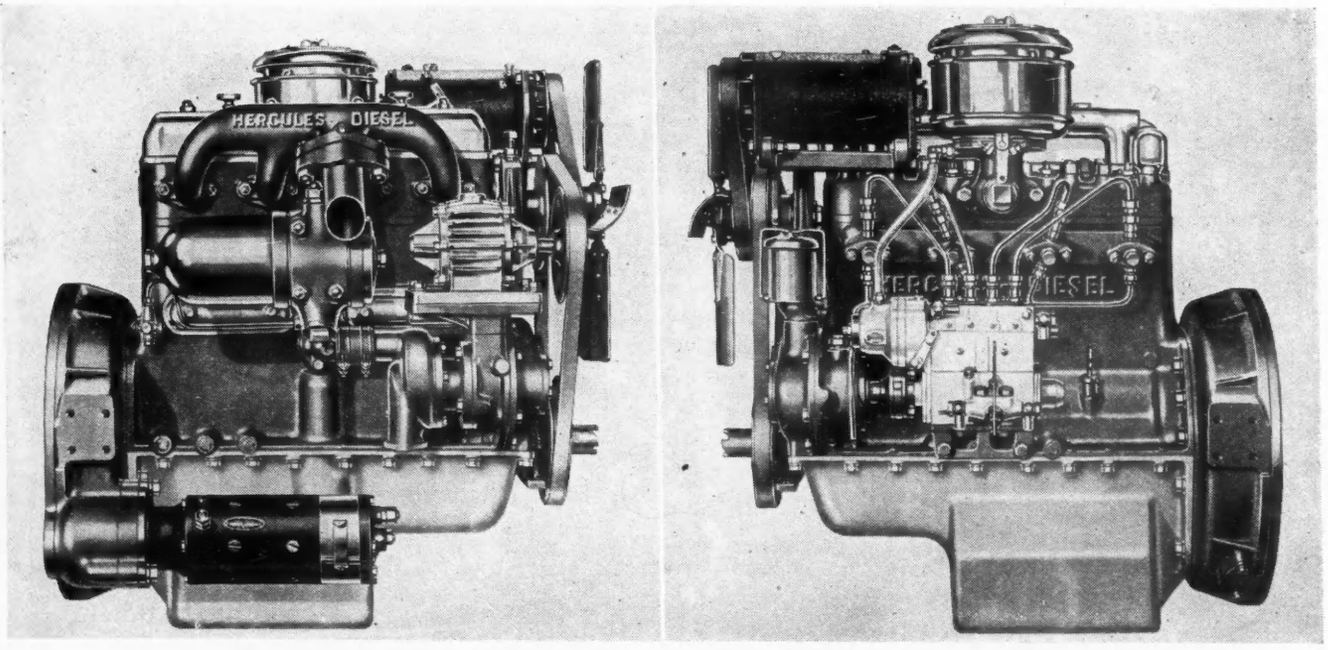
These engines have five-bearing crankshafts with Tocco-hardened bearing surfaces, that are rigidly supported by the engine block. The engine block also supports the four-bearing camshaft. Pistons are of aluminum alloy and connecting rods of chrome-nickel-molybdenum steel, rifle-drilled for pressure lubrication of the piston-pin bearing, and heat-treated. Piston pins are of the full-floating type.

In the design of these engines particular attention was given to the water jackets

(Turn to page 689, please)

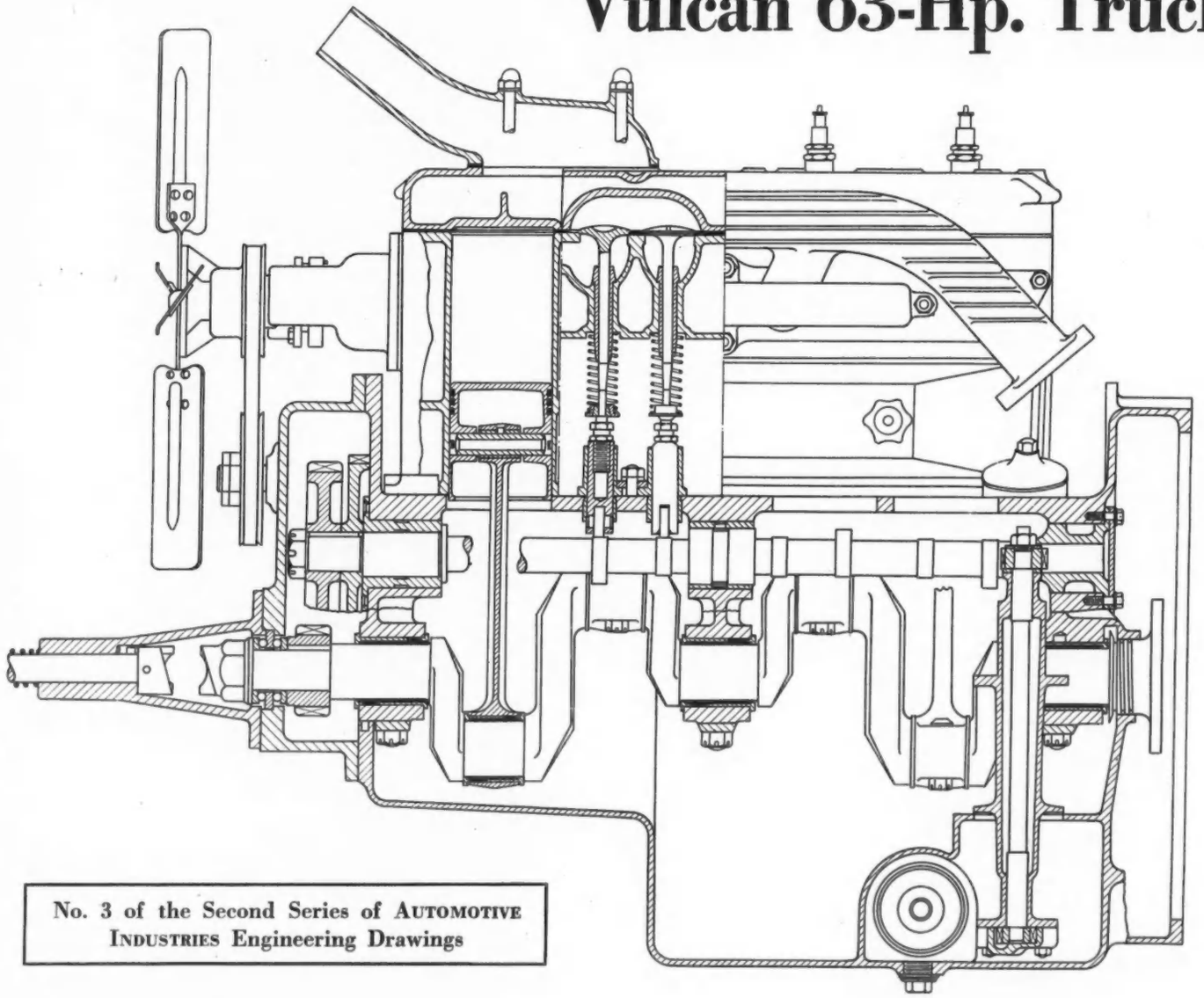
Hercules Four-Cylinder Diesel Specifications

Model	Bore & Stroke	Cu. In. Displacement	Max. H.P. at R.P.M.	Max. Torque at R.P.M.	Comp. Ratio	Injection System Make	Approx. Wt. With Fuel Handling Equip.
DOOB	3¾ x 4½ in.	198.8	62 at 2600	142 at 1400	14.5	Bosch type	750 lb.
DOOC	4 x 4½ in.	226.2	70 at 2600	162 at 1400	14.5	Bosch type	750 lb.
DOOD	4¼ x 4½ in.	255	56.5 at 1600	183 at 1400	14.5	Bosch type	750 lb.



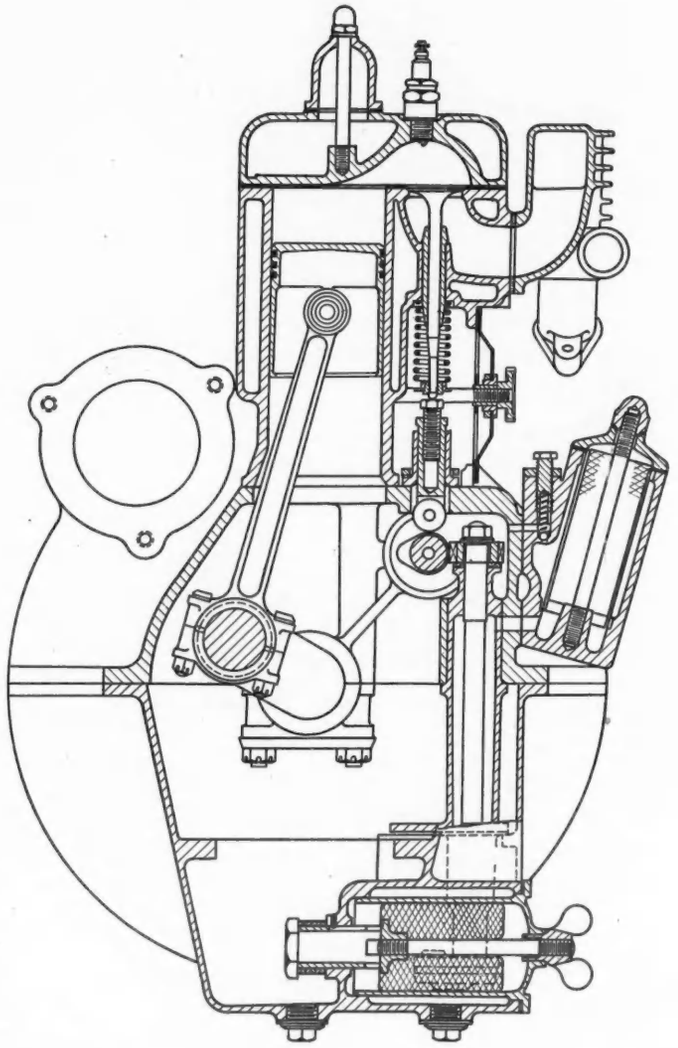
Two views of the Hercules Model DOO four-cylinder Diesel engine, the view on the right showing the fuel pump side.

Vulcan 63-Hp. Truck Engine



This longitudinal section shows details of the piston and valve design, the crankcase and the way the two oil filters are mounted in and on it respectively, the front-end drive for the camshaft and accessories, and the deep oil sump under the rear section of the engine.

No. 3 of the Second Series of AUTOMOTIVE INDUSTRIES Engineering Drawings



Vulcan Truck Engine

This four-cylinder engine, which is used on the Vulcan 3½-ton truck manufactured by the Vulcan Motor & Engineering Co., Ltd., of Southport, England, has a bore of 90 and a stroke of 130 mm. (3.54 by 5.10 in.) and a piston displacement of 201 cu. in. It is rated 63 b.hp. at 3,000 r.p.m. and is said to develop its maximum torque of 152 lb-ft. at 800 r.p.m. Features of design include a Ricardo cylinder head, an induction manifold and masked inlet valves with roller type cam followers, a chrome-alloy cast-iron cylinder block, an aluminum crankcase, crankshaft journals of 2⅛ in. diameter, 1⅞-in. pins, H-section steel connecting rods, heat-treated Hiduminium die-cast pistons with ⅞-in. diameter 3 per cent nickel case-hardened wrist pins, white-metal big-end bearings in bronze shells, phosphor-bronze little-end bushings, and white-metal die-cast journal bearings. The gear-type oil pump delivers to the rear end of the hollow camshaft, oil passing thence through the camshaft and through ducts to the crankshaft main and the big-end bearings. It also passes through suction and pressure filters. Ignition is by magneto and the pump for the cooling water is on the shaft of the belt-driven fan.

Company Earnings

(Continued from page 660)

Spicer Mfg.

Reported $983,564 net profit for nine months ended Sept. 30 before federal surtax on undistributed profits, compared with $911,842 same basis a year ago.

Electric Auto-Lite

Reported net income of $866,091 or 72 cents a share for the third quarter, against $808,169 or 66 cents a share for same period of last year. Royce G. Martin, president, said October would be best month in 1937. He reported 50,000 daily spark plug production and said this volume should add materially to 1938 earnings.

Motor Wheel

Reported net income for the September quarter of $439,018 or 52 cents a share, compared with $374,132 or 44 cents a share for the 1936 period.

Motor Products

Reported net income for the September quarter of $318,006 or 81 cents a share, against $152,345 or 39 cents a share for the like part of 1936.

Allen Industries

Reported net income for the September quarter of $72,329 or 28 cents a share, against $119,203 or 43 cents a share for the 1936 quarter.

Kingston Products

Reported net income for the nine months ended Sept. 30 of $236,863 or 20 cents per common share, against $104,114 or 8 cents a share, based on the present capitalization, for the 1936 period.

American Forging & Socket

Reported net income for the fiscal year ended Aug. 31 of $382,437 or $1.65 a share. The net income was stated after Federal surtax.

Doehler Signs with CIO

Doehler Die Casting Co. signed a perpetual contract with National Association of Die Casting Workers, a CIO affiliate, providing for arbitration of differences between management and employes, amendment, and provisions for change of pay scales. The contract applies to employes in Batavia, N. Y., Pottstown, Pa., and Toledo.

Toledo's auto show was picketed for two days by members of the United Automobile Salesmen affiliated with the CIO and UAW. By Oct. 30 an agreement was reached making the union the exclusive bargaining agent for salesmen, and providing for a minimum scale of commissions ranging from $15 to $35 a car, and a $25 a week drawing account and no deductions for trade-ins. Dealers won a concession in maintaining salesroom hours from 9 a. m. to 9 p. m.

Exports Still Far Over 1936 Totals

Medium and Higher Priced Passenger Car Movement Dips Slightly in September

	SEPTEMBER 1937		SEPTEMBER 1936		NINE MONTHS ENDED SEPTEMBER 1937		1936	
	No.	Value	No.	Value	No.	Value	No.	Value
EXPORTS								
Motor vehicles, parts and accessories	.....	$ 23,296,152	.....	$ 12,450,770	.....	$ 251,927,115	.....	$ 174,542,113
PASSENGER CARS								
Passenger cars and chassis	5,999	3,140,018	4,445	2,796,572	160,339	92,899,015	125,645	70,784,024
Low price range $850 inclusive	5,692	2,739,961	4,022	2,228,689	146,880	77,887,087	115,838	59,652,045
Medium price range over $850 to $1,200	249	246,040	287	264,882	11,033	10,490,870	7,937	7,638,092
$1,200 to $2,000	37	57,772	65	108,169	1,773	2,720,243	1,245	1,854,049
Over $2,000	21	96,245	71	194,832	653	1,800,815	625	1,639,838
COMMERCIAL VEHICLES								
Motor trucks, buses and chassis (total)	15,161	9,935,484	6,352	3,765,432	123,374	72,947,887	81,242	41,658,289
Under one ton	2,338	923,253	833	331,049	16,439	6,508,656	12,724	4,832,972
One and up to 1½ tons	8,974	4,598,849	4,405	2,261,996	81,431	39,733,473	53,826	24,946,744
Over 1½ tons to 2½ tons	2,712	2,489,988	904	793,777	18,576	14,363,863	10,633	7,786,298
Over 2½ tons	967	1,793,212	183	351,175	5,788	11,409,340	2,209	3,205,773
Bus chassis	170	130,182	27	27,435	1,140	932,552	1,850	886,502
PARTS, ETC.								
Parts except engines and tires	.....	.....	.....	.....	.....	.....	.....	.....
Automobile unit assemblies	.....	5,302,743	.....	2,212,979	.....	42,362,506	.....	31,282,114
Automobile parts for replacement (n.e.s.)	.....	3,052,786	.....	2,364,183	.....	28,178,424	.....	19,826,137
Automobile service appliances	.....	450,469	.....	483,114	.....	4,935,835	.....	3,347,806
Airplanes, seaplanes and other aircraft	45	1,725,438	20	468,840	455	15,457,333	372	8,065,939
Parts of airplanes, except engines and tires	.....	1,024,542	.....	608,598	.....	7,550,727	.....	4,192,319
INTERNAL COMBUSTION ENGINES Stationary and Portable								
Diesel and semi-Diesel	81	263,843	35	35,925	646	1,629,388	291	843,201
Other stationary and portable	.....	.....	.....	.....	.....	.....	.....	.....
Not over 10 hp.	1,362	89,445	1,222	62,420	15,283	839,423	8,906	547,270
Over 10 hp.	177	89,659	181	91,403	2,628	1,257,738	1,743	730,045
Automobile engines for:								
Motor trucks and buses	5,768	565,037	2,400	239,523	27,083	2,685,416	17,917	1,741,201
Passenger cars	3,831	278,384	3,202	262,361	64,183	4,393,310	36,682	2,563,917
Engines for aircraft	74	350,009	120	812,209	786	4,252,048	616	3,358,957
Accessories and parts (carburetors)	.....	197,560	.....	137,636	.....	2,054,982	.....	1,440,743
IMPORTS								
Automobile and chassis (dutiable)	247	120,745	144	56,357	1,490	902,123	647	306,436

New Passenger Car Registrations *

	September 1937	August 1937	September 1936	NINE MONTHS 1937	NINE MONTHS 1936	Per Cent Change, 9 Months, 1937 over 1936	Per Cent of Total Nine Months 1937	Per Cent of Total Nine Months 1936	ELEVEN MONTHS 1937 Models	ELEVEN MONTHS 1936 Models	ELEVEN MONTHS Per Cent Change
Ford	48,330	53,327	53,247	677,249	606,934	+ 11.5	23.52	22.81	768,310	718,111	+ 7.0
Chevrolet	55,232	69,711	54,369	610,743	752,021	− 18.8	21.21	28.26	754,396	873,242	− 13.6
Plymouth	29,817	42,848	28,576	384,799	376,953	+ 2.0	13.36	14.17	474,202	439,805	+ 7.8
Dodge	16,261	23,618	14,725	210,988	190,003	+ 11.0	7.33	7.14	253,206	222,879	+ 13.5
Pontiac	14,289	20,538	9,027	174,151	131,552	+ 32.4	6.05	4.94	206,251	153,972	+ 34.0
Oldsmobile	11,001	17,172	6,514	155,761	148,963	+ 4.3	5.41	5.60	180,079	176,531	+ 2.0
Buick	11,246	16,050	5,329	154,236	113,620	+ 36.0	5.36	4.27	191,921	138,523	+ 38.4
Packard	4,614	7,534	5,979	78,623	45,399	+ 73.3	2.73	1.71	93,120	54,052	+ 72.0
Chrysler	6,753	8,277	3,131	71,749	43,545	+ 65.0	2.49	1.64	84,070	48,225	+ 74.1
Terraplane	4,489	6,975	4,156	63,598	60,967	+ 4.4	2.21	2.29	77,176	70,966	+ 8.6
De Soto	5,370	7,321	2,654	59,904	33,258	+ 80.4	2.08	1.25	69,069	37,017	+ 86.3
Nash	3,818	5,989	1,998	58,227	31,891	+ 82.6	2.02	1.20	66,629	37,165	+ 79.2
Studebaker	4,284	5,293	4,675	57,089	48,022	+ 18.9	1.98	1.80	69,392	53,988	+ 28.5
Willys	3,476	5,147	999	43,439	9,762	+344.0	1.51	.37	45,121	11,973	+276.0
La Salle	1,805	2,705	866	23,207	8,977	+159.0	.80	.34	27,679	11,169	+149.5
Lincoln	1,734	2,173	1,102	20,334	9,956	+104.0	.71	.37	24,098	10,928	+120.5
Hudson	790	1,207	980	12,291	16,396	− 25.0	.43	.62	15,657	20,564	− 23.8
Graham	1,228	1,296	1,076	11,594	12,723	− 9.0	.40	.48	14,132	14,555	− 2.7
Cadillac	634	987	782	9,310	8,761	+ 6.2	.32	.33	11,684	10,946	+ 6.3
Cord	79	130	88	1,043	943	+ 10.8	.04	.04	1,181	943	+ 25.4
Pierce-Arrow	3	1	67	150	621	− 75.8	.....	.02	250	777	− 67.8
Auburn	.....	5	91	144	1,626	− 91.3	.....	.06	279	2,134	− 87.1
Hupmobile	40	23	.....	63	.....	.....	.....	.....	63	.....	.....
Miscellaneous	149	97	620	1,071	7,782	− 86.3	.04	.29	2,676	9,732	− 72.5
Total	225,442	300,414	203,051	2,879,743	2,660,675	+ 8.2	100.00	100.00	3,430,621	3,118,197	+ 10.1
Chrysler Corp.	58,201	82,064	49,086	727,420	643,759	+ 13.0	25.26	24.20	880,547	747,926	+ 17.8
Ford and Lincoln	50,064	55,500	54,349	697,583	616,890	+ 13.0	24.22	23.19	792,408	729,039	+ 8.8
General Motors	94,207	129,163	76,887	1,127,408	1,163,894	− 3.4	39.15	43.74	1,371,990	1,364,383	+ 0.5
All Others	22,970	33,687	20,729	327,332	236,132	+ 38.7	11.37	8.87	385,676	276,849	+ 39.0

*Less Wisconsin for July, August and September.

London Automobile Show at Earls Court

(Continued from page 681)

other models this transmission is optional, the alternative being a preselective (Wilson) gearset with centrifugal clutch.

The last-mentioned combination is now standard on all Armstrong Siddeley (six-cylinder) cars, the makers of which have adopted what they term a "balanced drive." This implies the abolition of a separate flywheel and the use of the running gear of the planetary transmission in its stead. Actually the rotating members of the gearset, the starter gear ring and the centrifugal clutch take the place of the mass of the flywheel.

All three units of the Humber-Hillman-Talbot combine (which also includes Commer and Karrier in the truck side of the industry) have produced new models, and there are many points of family resemblance, notably in the independent front suspension. There are two new Humbers, identical apart from engine size and gear ratio; both are sixes, one of 157 cu. in. (16 hp.) and the other of 194 cu. in. (21 hp.) developing 60 b.hp. and 78 b.hp. respectively. The wheelbase is 114 in. and the track 56 in.. and the weight in each case (with five-passenger sedan body) is 3360 lb.

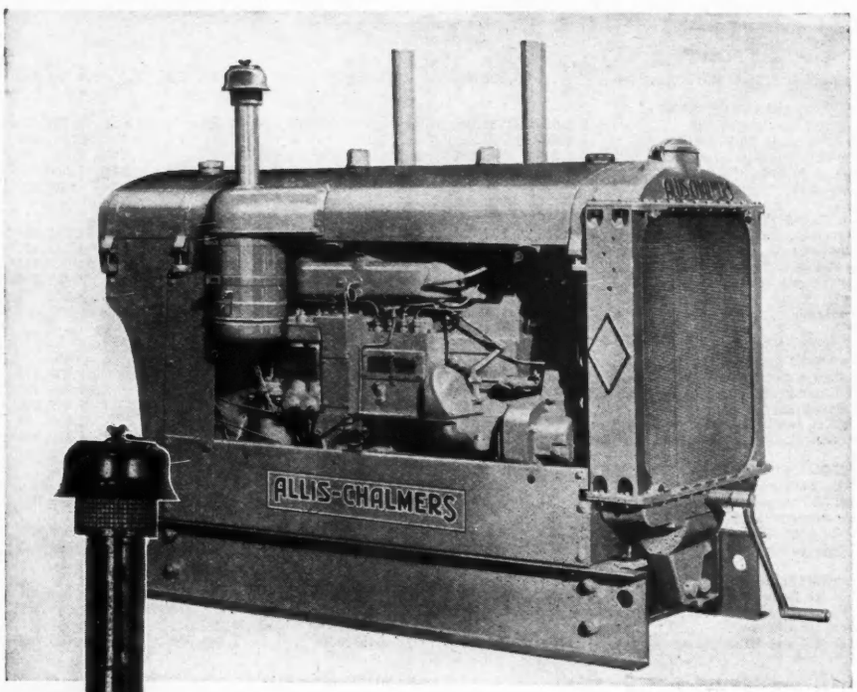
The front suspension consists of an inverted half-elliptic transverse spring centrally attached to a massive cross-member of the frame, its ends serving with a triangulated link to support the steering swivels. Steering is effected by a forked drop arm moving laterally in an almost horizontal plane, with coupling rods running left and right direct to the knuckle levers.

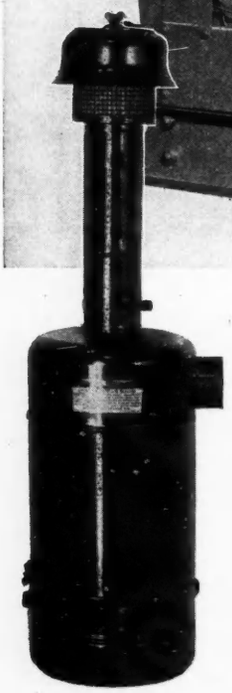
Overhead valves with pushrod operation are used in these Humber engines, with inserted exhaust seats, aluminum cylinder head of 6.5 compression ratio, and a Stromberg downdraft carburetor with automatic choke linked to the slow-running stop to give a high idling speed while the engine is warming up. The engine has an unusually flexible mounting; there is a single live rubber support at the front and a double one at the rear, the latter consisting of two inclined rubber pads so close together as to represent no more than a wide single point of flat V shape. An innovation lies in the "monopoise mounting" of a unit consisting of the radiator block resting on a pressed steel unit with side extensions forming the front fender brackets. This unit is supported centrally by a rubber pad resting on the front cross-member of the chassis and is thus, with front fenders and front end of the hood, insulated from chassis distortion.

With no-draft ventilating panels, hinged quarter lights, safety glass throughout, leather upholstery and sliding roof, the all-steel sedan has separate flush lockers at the rear for luggage and the spare wheel. The 21 hp. is claimed to exceed 80 m.p.h. and to accelerate on high from 10 to 30 m.p.h. in 7.5 seconds; its price is £345, which is £100 less than the 16 hp. Humber it displaces; the new 16 hp. is £330 with the same body and equipment.

The new Hillman is a big four, its overhead valve engine having a piston displacement of 120 cu. in. Closely resembling the new Humber Sixes in design, having the same wheelbase and track and with a sedan body differing mainly in the quality of finish and furnishings, the price is £248, or with deluxe equipment £268.

Lagonda at Olympia last year exhibited a new V-12 with torsion-bar independent front suspension, but is only





Standard equipment on several models Allis-Chalmers, Buda, Hercules and LeRoi power unit engines.

Oil Bath Protection For Power Units—
Gas, Oil and Diesel Types

No matter whether a power unit is well housed in an engine room of a small municipal electric light plant or is in the engine house of an oil well drilling outfit in a Texas oil field, much the same excessive engine wear occurs if motor is not protected with a good oil bath air cleaner. Air, laden with abrasives, is a prevailing atmospheric condition of today.

Abrasives, if permitted to enter a carburetor or a Diesel engine air intake, soon cause destructive engine wear. A United oil bath air cleaner keeps out the abrasives so that when dust clouds hide the sun, an engine with UNITED protection still develops its full rated power long after less guarded motors have been torn down and reconditioned.

When you buy a power unit, insist that it be protected with a UNITED Oil Bath air cleaner —just good insurance against excessive engine wear.

UNITED AIR CLEANER CO.

Division of UNITED SPECIALTIES COMPANY

9705 Cottage Grove Ave. Chicago, Illinois

just now commencing deliveries of this model. At Earls Court is shown a new six-cylinder model, though it differs from the V-12 in little more than engine type and gear ratio. Like the V-12 the new Six is a super-grade job, the sports sedan being £1,195 and having a 100 m.p.h. performance. With a bore and stroke of 88.5 x 120.6 (3½ in. x 4¾ in., 271 cu. in.) the overhead valve engine develops 140 b.hp. at 4000 r.p.m.; the cylinder head is of cast iron, with a compression ratio of 6.68. There are two spark plugs per cylinder, ignition being by twin Vertex magnetos with automatic and manual control; twin S. U. carburetors are used. The independent front suspension comprises wishbone brackets of which the lower on each side is secured to a long torsion bar running back for part of its length inside the box section of the frame and arranged so that its fixed rear end can be adjusted if desired. Shock absorbers are adjustable by a driver control.

The Lagonda V-12 (273 cubic) develops 180 b.hp. at 5580 r.p.m., this high crankshaft speed being made possible by the relatively short stroke of 3 5/16 in., the bore being 2 15/16 in. The light-alloy connecting rods run direct on a nitrided crankshaft. An overhead camshaft is used on this engine and ignition is by dual Delco-Remy coils with centrifugal and vacuum timing control. Brakes are Lockheed with dual master cylinder. Transmission includes a four-speed synchromesh gearset (synchromesh on three speeds) and hypoid final drive. No figures of this model are yet available, but with an engine developing 180 b.hp. and the sedan weighing only 4200 lb., the makers claim "prodigious speed and acceleration." The sedan is £1,550 on the 124-in. wheelbase chassis; a 138-in. wheelbase is to be available for a seven-passenger limousine.

Rolls-Royce has made no change of note in the 40-50 hp. V-12 or the 25-30 hp. Six. The associated Bentley shows a sports sedan of which the peak of the roof and the sliding section are paneled with Perspex, a synthetic glass produced by the Triplex Safety Glass Co., one of whose two types of safety glass ("sandwich" and "toughened") is found on practically all British cars for the windshield and all windows.

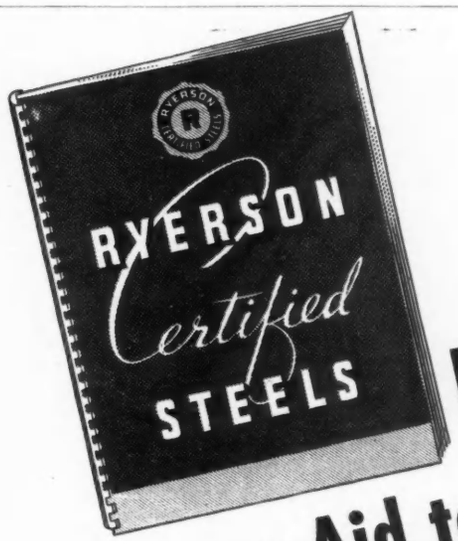
Hillman shows an example of the redesigned Ten-Four with all body panels, roof, hood and cowl formed of Perspex —but not as a car for use, merely as a show attraction.

As for many years past, the majority of British sedans have the front half of the top capable of sliding back to provide what is termed a "sunshine roof." This feature has been applied to all-steel bodies, the sliding section also being of sheet steel and being flush with the general roof line when closed; it moves under the fixed rear part when opened.

Although the pillarless sedan is a British conception, examples of it are shown at Earls Court only by Fiat and Lancia. Nearly all British makers are offering a second type of sedan known as the "touring saloon," which has close-coupled seating, four doors and four lights, and the rear panel (below the rear light) extending to form a larger luggage and spare wheel locker than on the standard sedan.

A four-passenger coupe is also included in most lines, this type having experienced a rapidly increasing demand during the past year or two. It has two wide doors, quarter lights, a large extending rear locker and close-coupled seating.

Leather for upholstery covering is all but universal in British sedans and coupes, and is often found in limousines too. Tubular framed front seats are widely in evidence, usually being separate and always adjustable. Rubber underlay for the leather, instead of hair or fabric, is used in some cases with



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spring cushions, and there are a few more examples of Dunlopillo (cellular rubber) cushions or pneumatic fillings, but neither of these is at all widely used.

There is a trend toward increased seat widths in five-passenger cars, some of which have been "five-seaters" in name only, with rear seats no wider than 50 in. or so at elbow height and cushions only 42-44 in. wide. It is now becoming recognized that the rear seat of a five-passenger car should be at least 56 in. wide at elbow height and have a 50-in. wide cushion. To this end some of the small cars of 12 hp. or 14 hp. rating are being given a 56-in. track. Exceptions are the new Daimler Fifteen-Six and the new Lanchester Fourteen-Six, both with a 52-in. track. These two cars are the first to be produced by the associated Daimler Lanchester companies with independent front suspension; the Andre Girling type is used, in which each swivel axle is located by a short link at the top and a long one at the bottom, with a radius arm running back to the bracket on the frame side; the flexible unit is a coil spring, while the shock absorber spindles are coupled to a transverse anti-sway bar.

The new Daimler, like all other models of this make, has the fluid flywheel and preselective transmission, but the Lanchester is distinctive in having at buyer's option either the Daimler or a synchromesh transmission, the price with the latter being £25 less (£340 instead of £365).

Alvis has resuscitated the four-cylinder model that was discontinued two years ago. It is a "high-efficiency" job known as the 12-70 hp. (112 cu. in.) with sedan prices from £435, a wheelbase of 106 in. and a 50 in. track. It is claimed to have an 80 m.p.h. performance; unlike all six-cylinder Alvis cars (including a new Twenty) it has half-elliptical springing instead of independent front suspension—the latter a feature pioneered in England by Alvis ten or more years ago. The new six-cylinder Twenty (168 cu. in.) is offered at £150 less than any previous Alvis of this size, the sedan being £595; it can be had with a 143 cu. in. engine at £565.

Standard is distinctive in being the only British make on a large production basis (in British eyes) with no new models (apart from additional body styles) and with only minor changes in the five continued types ranging from the Nine to the V-8 Twenty. All have a new frontal appearance, however, due to different styling of radiator grille and fenders; as with several other British makes, the chromium plated grille framing is displaced by a framing finished to match the color of the car and the slats are plated instead of being colored.

THE smart lines of the modern motor car make a strange contrast with the crude designs of the 1837 "steam-bus" . . . an amazing march of progress during a century of development. Today's transportation equipment is the greatest of all time . . . the result of constant teamwork between steel metallurgists and automotive engineers to produce a better car.

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has been a major factor in this product improvement by providing increased strength with reduced weight, and longer service life at lower cost. B&L engineers have specialized in the making of fine alloy and carbon steels for the exacting needs of the automotive designer. B&L Cold Finished Bar Steels, Shafting and Screw Stock . . . . produced to rigid standards of accuracy, uniformity and quality . . . are enabling manufacturers to give the public greater motor car values than ever before.

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NSPA Indexes Rise

The NSPA index of replacement parts shipped to wholesalers rose from 131 in August to 132 in September against 141 a year before. The index of shop equipment and tools shipped to wholesalers went up to 166 from 161 against 136 in September, 1936. Original equipment shipments to vehicle manufacturers went to 236 from 215 in August and compared with 148 a year earlier. Export shipments went to 142 from 129 in August, against 96 a year before. All were calculated against monthly 1934 sales as 100.

Cuts Alcohol in Fuels

A reduction of 1½ per cent in the amount of alcohol required to be used in motor fuels has been decreed by the German Alcohol Monopoly, according to reports reaching the Commerce Department's chemical division. A former decree provided that all motor fuels should contain at least 10 per cent domestically produced alcohol.

Hercules Building 4-Cyl. Diesels

(Continued from page 682)

and water passages. A large centrifugal pump is provided and the flow of cooling water is particularly rapid at the high-temperature areas. The cooling fan is driven by a Vee belt from a pulley mounted on an extension of the crankshaft.

Lubrication is by force feed, supplied by gear pump, to all main, connecting-rod, and piston-pin bearings, and to the gear train, as well as to the over-head valve mechanism. Splash or throw-off from the connecting rods lubricates the cylinder walls. A large-size oil filter is furnished with the engine to insure clean oil.

A plunger-type fuel pump is used, built with a vacuum-type governor as an integral part of the pump, and it is mounted on the same side of the engine as the fuel injectors, intake manifold, air cleaners and generator. On the exhaust manifold side are mounted the lubricating oil filter, water pump, and starting motor.

The series of Hercules "DOO" Diesels is available in power unit form, either fully enclosed or in the open type of assembly, such as is used for pump and generator drives and industrial applications generally.

TOOLS OF TOMORROW

(Continued from page 665)

new grinding wheel on the machine. As the wheel wears and the swivel head is advanced the heavy grease will gradually be forced out through all joints. Action of the grease coming out eliminates the possibility of grit or dirt working in.

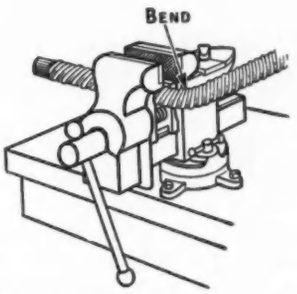
An additional feature of this fixture is an adjustable stop for limiting the length of travel of the swivel head, parallel to the wheel. Although the usual practice is to grind the lip rake angle of Landis chasers by hand on the straight wheel, it is now possible to grind this angle on the cup wheel, if it is desired to do so.

A new type of swivel head is employed on all Landis chaser grinders. The chaser clamping screw contacts the chaser on the dovetail surfaces in the same manner as the chaser clamp on a die head.

Bendable Metal Tubing

A spiral metal tube which can be readily bent without the use of tools, dies or forms is being offered the automotive field by Pratt Industries, Inc., Frankfort, N. Y. It is an adaptation of the firms patented stiff spiral tubing which has been manufactured by it for a considerable number of years. By introducing a V-shaped bead in the flat between the ribs of the tube, a pipe is obtained which can be readily bent by hand by holding it in a vise as indicated by the illustration. It is stated that the pipe is in no sense flexible and will retain the shape to which it is bent.

One of the possible applications of this bendable pipe in the automotive field is said to be to buses and similar vehicles, where it is often desirable to extend a muffler tail pipe to the extreme rear. Usually the quantities involved are not sufficient to warrant the making



Method of bending Pratt bendable pipe

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DISINFECTANT

With this order . . you halt Oil Dermatitis

HERE is the surest way to protect your men against the dangers of oil infection. Simply sterilize cutting lubricants with Derma-San. One pint poured into 35 gallons of lubricant quickly kills pus-forming germs before they attack workers. For Derma-San is a powerful disinfectant. It is non-toxic, non-corrosive. It never clogs feed pipes . . . never irritates the hands. You'll find Derma-San the most economical, dependable protection you can buy. It will help keep your men at work, increase efficiency, save you money. Order a drum — today.

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of special forms with which to bend ordinary steel pipe to the desired form, hence this new type of pipe comes in handy.

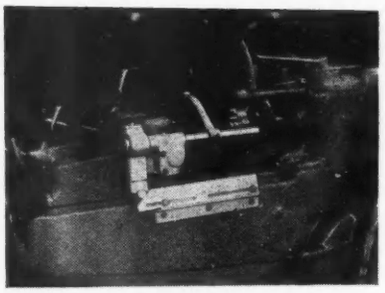
Work Stop

. . . automatic attachment designed for Landmaco threading machine

An automatic work stop for use on Landmaco threading machines has been designed by the Landis Machine Co., Waynesboro, Pa. The attachment is useful where it is desired to locate stock in the same relative position for threading. It is also applicable to operations where the thread is close to a shoulder and where thread length, for each piece, must be maintained.

The unit consists of a bracket, fastened to the end of the carriage front, which supports a horizontal shaft. A stop arm mounted on the shaft is adjustable for any distance up to the length of the carriage travel of the machine.

The end of the shaft nearest the operator is fitted with a pinion gear that engages in a vertical rack gear. A cam fastened to the bed of the machine is used to actuate movement of the stop arm as the carriage moves forward or backward. A roller on the end of the rack gear operates on the cam to reduce friction between the cam and rack gear.



Landis automatic work stop for use on Landmaco threading machines.

The cam has elongated slots that make it adjustable to any position. When the carriage is back, or in position for loading and unloading, the stop arm is down. After the piece to be threaded is gripped in the vise, the cam is set so that the stop arm raises with the first forward movement of the carriage. This eliminates the possibility of the arm striking the head and causing any damage.

ONLY LAPPING *As Strom Does It* CAN PRODUCE SUCH PRECISION

Strom Steel Balls possess a degree of surface smoothness and sphericity that has never been equalled in any other regular grade of ball. Such precision is exclusive with Strom because it can be attained only through a series of lapping operations such as are standard practice in the Strom plant.

Physical soundness, correct hardness, size accuracy and sphericity are guaranteed in all Strom Balls.

Other types of balls—*stainless steel, monel, brass* and *bronze*—are also available in all standard sizes. Write for complete details.

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1850 So. 54th Avenue, Cicero, Ill.
The largest independent and exclusive Metal Ball Manufacturer

AUTOMOTIVE ABSTRACTS

(Continued from page 666)

the other claims of less glare and greater facility of vision the evidence is inconclusive, but it is apparent from the information now available that further work is unlikely to show that any considerable advantage can be gained from the use of colored light. These investigations, of course, can throw no light on any possible personal preference of an individual motorist for light of one color or another.—*The Engineer*—Oct. 8.

Tire, Tube Stocks Drop

Stocks of automobile inner tubes held by distributors on October 1 were nearly 11 per cent lower while stocks of casings held were 1 per cent lower than on Oct. 1, 1936, according to the results of the quarterly survey made by the leather and rubber division, Bureau of Foreign and Domestic Commerce.

This survey reveals that stocks of inner tubes held by distributors of all classifications (excluding those holding stocks of less than 100 casings) amounted to 6,263,000 on October 1 as compared with 7,035,000 on the same date a year ago. Stocks of casings held, however, remained fairly steady as the total number held on October 1 amounted to 5,992,000 compared with 6,046,000 held on the corresponding date of last year.

Stocks of casings held by individual dealers on October 1 amounted to 1,929,000 compared with 2,465,000 in stock on April 1, 1937, and 2,179,000 held on October 1 a year ago. Stocks of tubes held by individual dealers on

Oct. 1, 1937, amounting to 2,268,000, also reflected a healthy decline as compared with 3,155,000 on April 1, 1937, and 2,710,000 on Oct. 1, 1936.

Reports from 42 firms distributing tires through chains of filling stations as well as through independent stations and serving a total of 40,058 outlets reflected a considerable decline in stocks of casings held on Oct. 1, 1937, as compared with July 1 of the same year, but only a slight decline in stocks of inner tubes. Total stocks of casings reported by oil company distributors on October 1 amounted to 1,112,344 compared with 1,244,562 on July 1, while stocks of inner tubes on October 1, amounting to 1,227,930, remained at a fairly steady level when compared with 1,221,032 held on July 1, 1937.

Reports from six tire manufacturing companies covering stocks held in company operated retail outlets and six other mass distributors reported that the number of casings held in 3,758 stores on October 1 totaled 2,274,575 as compared with 2,286,389 casings in 3,713 stores on July 1, 1937. The number of inner tubes held in stock by this group reflected a greater decline at the end of the third quarter when stocks of inner tubes amounted to 2,029,335 on October 1 as compared with 2,118,025 on July 1.

BOOK REVIEWS

(Continued from page 668)

changes that have come over the whole problem of liquid fuel manufacture and utilization during the last few years" (author's Introduction). A few up-to-date illustrations also would have been desirable. While in the Introduction reference is made to the "almost universal use of downdraft carburetors during the last few years," a perusal of the book does not disclose a single illustration of a modern downdraft carburetor, and the majority of the types illustrated are more than twenty years old. Among these is the Mayer, of which it is said "this is an American carburetor which has been on the market for some years." It would have been more correct to say "this was an American carburetor which disappeared from the market some twenty-five years ago."

A similar lack of accuracy or precision with respect to dates is met with in other parts of the book. For instance, there is an Appendix IV to the first part of the book, that on Carburation, which is headed "Induction-Pipe Pulsations—Some Experiments by the Author," and which is reprinted "by Permission of *The Automobile*." As *The Automobile* has not been published since 1917, this material must have been written more than twenty years ago, yet the introductory sentence begins "The recent development of engine design in America," and there is nothing to indicate to the reader that this does not refer to development in, say, 1935, 1936, and 1937.

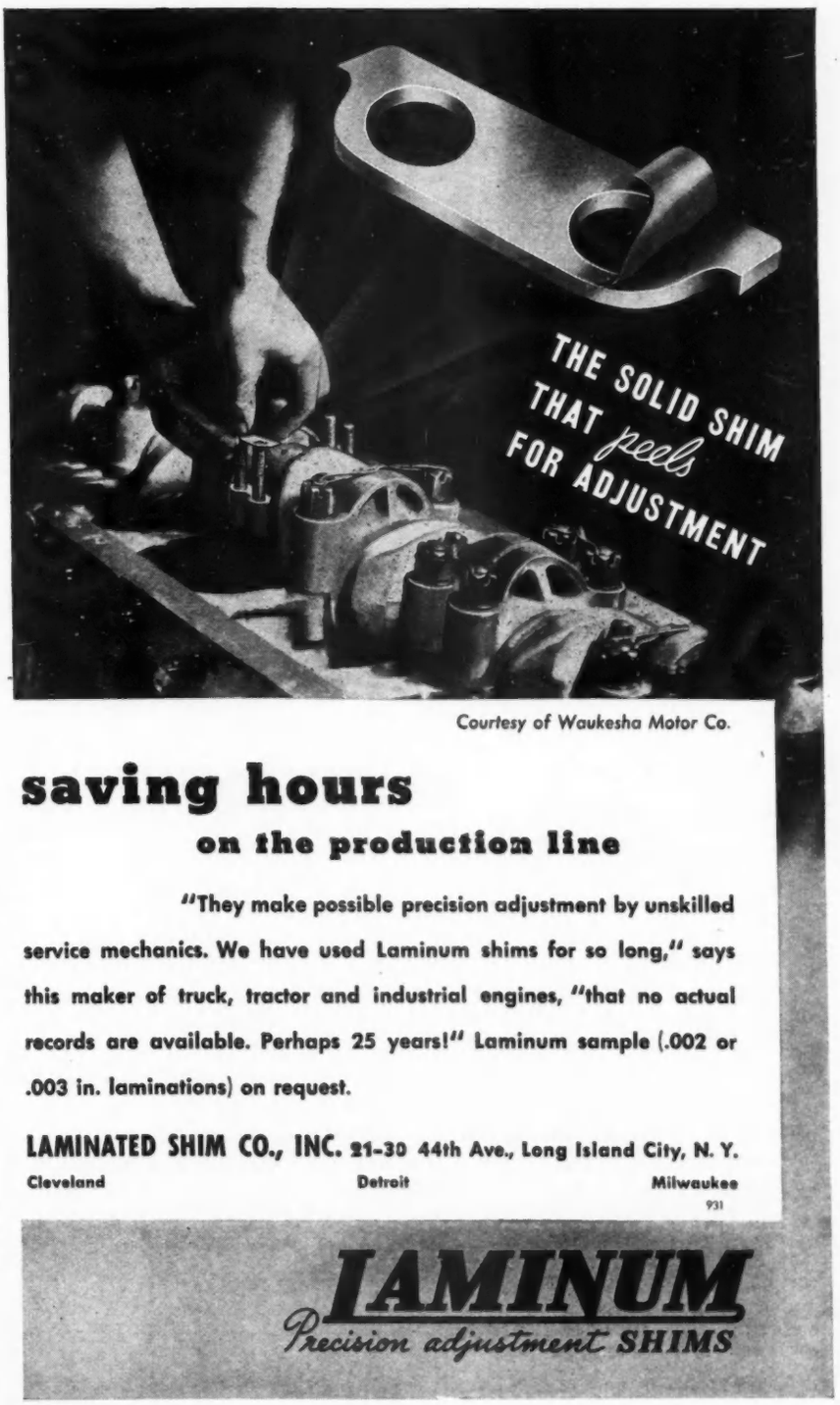
The section on manifolding also deals mainly with designs of about two decades ago, including several that were patented by the author previous to 1920.

In view of the above facts the book is perhaps more valuable as a history of early developments in carburetors and manifolding and as a discussion of some of the basic principles governing the design of these parts than as a guide to modern practice.

Reserve Board Indexes

The seasonally adjusted production index of the Federal Reserve Board for the automobile industry was 135 in September against 157 in August and against 107 in September, 1936. Unadjusted, it was 53 in September against 116 in August and against 42 a year before.

Unadjusted employment figures were indexed at 112.3 in September against 118.7 a month earlier and 90.3 a year earlier. Unadjusted payroll index was 105.4 in September against 115.3 in August and 77.3 in September of last year.



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Diesel Use Seen Broader

(Continued from page 661)

in the former's contention that Diesels have proven successful, citing the road's service and cost records as proof. He added that it is something entirely new for a railroad to be able to order half a dozen switch engines and have them delivered within a week just as though so many trucks were bought.

Diesel Fuel Tax?

A movement is under way to have the next Alabama legislature impose a tax on fuel oil, according to H. H. Houk, engineer of the state highway commission. The proposal is to have fuel oil pay the same per gallon tax is now paid by gasoline. Fuel oil used in Diesel engines and other types of industrial machines is now untaxed.

Tire Prices Advanced

(Continued from page 668)

nual volume of $15,000 or more, they have been extended to 15 per cent on $50,000 annual volume or more, thereby benefiting the larger operators. Dealer discounts for the most part remain the same on first and second lines, at list less 20 and 5 per cent. On third and fourth lines dealer discounts are narrowed from 17½ to 5 per cent to 15 and 5. Commercial account discounts which have been list less 15 have been narrowed to list less 13½ per cent with special volume bonuses thrown in for larger commercial accounts. These bonuses run from 5 per cent per $500 order up to 7 per cent on $1,000 or larger orders. Dealers handling commercial accounts are also given new bonuses for large accounts.

Although the price increase comes in the face of an extremely soft crude rubber market, with crude prices under 16c. per lb., manufacturers say that current crude prices have no relation to tire costs, as higher priced rubber is now being processed into tires.

FTC Hits Glass Units

Issues Cease and Desist Rule Under Patman Act

Charging violation of the Federal Trade Commission Act and the Robinson-Patman price-discrimination act, the FTC has issued a cease and desist order against substantially all domestic glass manufacturers and a large group of distributors charged with unfair competition.

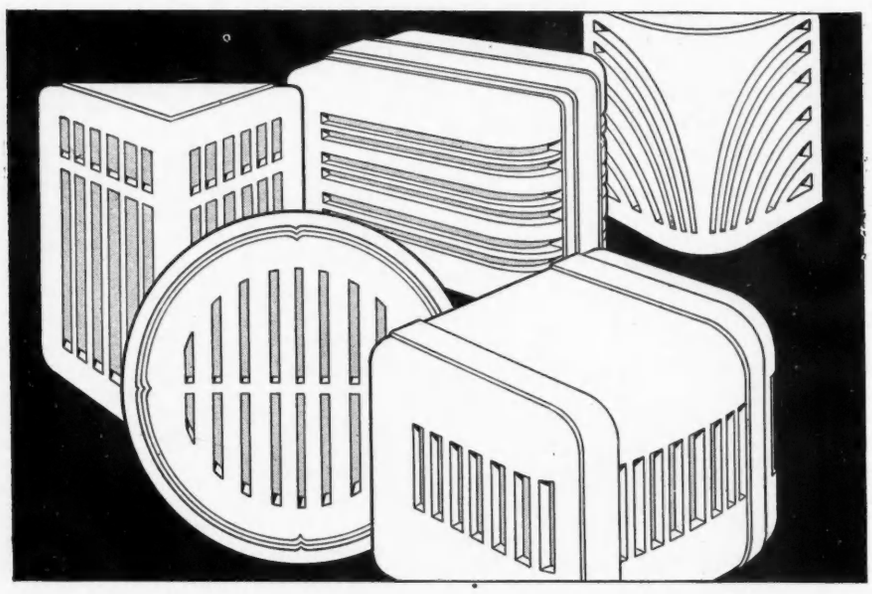
The entire membership of the Window Glass Manufacturers Association have been named by the commission, including the Pittsburgh Plate Glass Co. and the American Window Glass Co., of Pittsburgh; Libbey-Owens-Ford Glass Co., Toledo; Harding Glass Co., Fort Smith, Ark.; Adamston Flat Glass Co., and the Rolland Glass Co., Clarksburg, W. Va.; Scohy Sheet Glass Co., Sisterville, W. Va., and the Blackford Window Glass Co., Vincennes, Ind.

The order also has been directed against the 150 members of the National Glass Distributors Association.

Under the order, manufacturers are directed to discontinue the alleged practices of (1) collectively selecting customers for direct sales; (2) preventing dealers from buying glass in carload lots and directing that it be shipped to any designated point; and (3) advising dealers that certain concerns are not entitled to purchase on the same terms and conditions usually accorded the association's customers generally.

The order issued under the Robinson-Patman Act prohibits alleged price discrimination in carload lot purchases, said by the commission to have varied as much as 2½ per cent on glass of comparable grade, strength and size. Distributors were ordered to stop inducing manufacturers to discriminate in their prices.

Following preliminary investigation by the Federal Trade Commission last month on Treasury Department charges of alleged collusion and price fixing on the part of 14 tire manufacturers as an aftermath of the submission by these 14 companies of identical bids on Government tire requirements, Department of Justice representatives appeared in Akron, Nov. 1, and opened a series of hearings with officials of the companies involved.



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Here are suggestions of distinctively modern heaters possible with DUREZ

You know, and your dealers know, that it's easier to add a heater to a new car sale . . . or sell one later . . . when *your* heater looks better than those sold in cut-rate stores.

In planning new heaters, Durez is a perfect material to work with. You have unlimited possibilities in styling and color. You gain light weight, a hard lustrous surface finish. You can do away with rattly metal doors, mold the housing complete with deep flutes to direct the hot air toward the floor.

No matter what plastic applications you are considering, do not overlook the possibilities of Durez. As one of the largest suppliers of plastics to the automotive industry we have a wide range of data on Durez' present uses, advantages and possibilities which we will be glad to put at your service. For further information write General Plastics Inc., 211 Walck Road, North Tonawanda, New York.

General Plastics'

DUREZ *Choice of the Automotive Industry*

General Motors Assembly Plant at Linden, New Jersey

(Continued from page 677)

first see what the color of the car is to be. Here also the spare tire is put on the rear of the chassis loose; it is taken off just before the body comes down from the upper floor.

All of the wheels being now in place, the chassis comes off the chain conveyor and is put onto a floor conveyor, which moves it along but does not support it.

At this point the bodies come down from the upper floor and are lowered onto the chassis. The car is now moved along over a pit and from this point on, men work on it below in the pit, on the outside, and on the inside. Among the first operations after the body is in position on the chassis is the application of the radiator brace rods and the radiator hose. In order that the front fenders may not be scratched or otherwise injured while work is being done at the front end of the car, they are covered by a soft cloth, and a similar cloth protects the front seat while the last few operations are being performed in the interior. The insides of the front doors are protected with paper. Among the last assembling operations are the putting on of the steering wheel and of the hub caps. Steering wheels evidently would be in the way while other work was being done on the inside of the body, which is the reason they are put in position only at the very last.

The car now passes a conventional filling-station gasoline pump; its tank is partly filled, and the engine is started. In order to prevent annoyance to the workmen from the exhaust, just before the engine is started a sheet-steel exhaust pipe is put over the end of the muffler tail pipe, with its upper end extending into a large exhaust pipe over the assembling line, through a slot in the bottom thereof which is substantially closed by rubber strips.

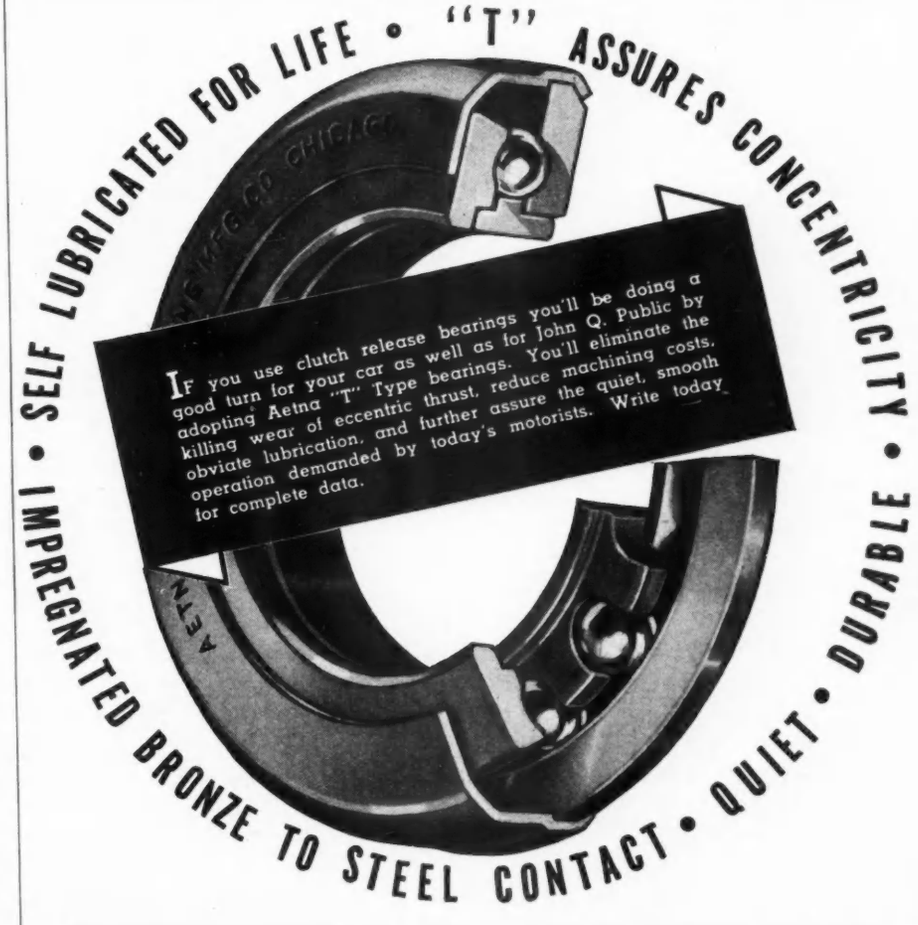
At the end of the line the car is subjected to three tests, one for headlight adjustment, another for toe-in, and the third for caster and camber. The headlight-adjustment testing equipment, which is illustrated by one of the photographs reproduced herewith, can be slid up and down two pillars at opposite sides of the pit, at the end of the assembly line. When a test is to be made the equipment is lowered into position on a level with the headlamps, the lights are turned on and the beams are thrown onto two screens mounted on horizontal tubes, where their patterns can be compared with the standard patterns. After the test has been completed the test rigging is raised and the car leaves the test stand.

The test for toe-in is performed at the same station as the test for headlamp adjustment. The toe-in is indicated by a pointer moving over a dial and can be read off by a man in the pit. When it comes to the end of the line each car bears a card on which is inscribed anything that calls for correction, and plenty of space is provided inside the building at the end of the assembly line to park the cars during the time required to make such corrections.

After any corrections that may be required have been made on the car at the end of the line, it is taken out of the building and driven around the test track. This track has a certain section with a washboard effect in the pavement, which is designed to test the springing. The braking action and the general running characteristics are also tested on the track.

To the west of the testing track is the loading platform for cars to be shipped by rail.

YOUR CAR DESERVES THE ALL-AROUND ADVANTAGES OF AETNAS


SELF LUBRICATED FOR LIFE • "T" ASSURES CONCENTRICITY •
• IMPREGNATED BRONZE TO STEEL CONTACT • QUIET • DURABLE •
If you use clutch release bearings you'll be doing a good turn for your car as well as for John Q. Public by adopting Aetna "T" Type bearings. You'll eliminate the killing wear of eccentric thrust, reduce machining costs, obviate lubrication, and further assure the quiet, smooth operation demanded by today's motorists. Write today for complete data.
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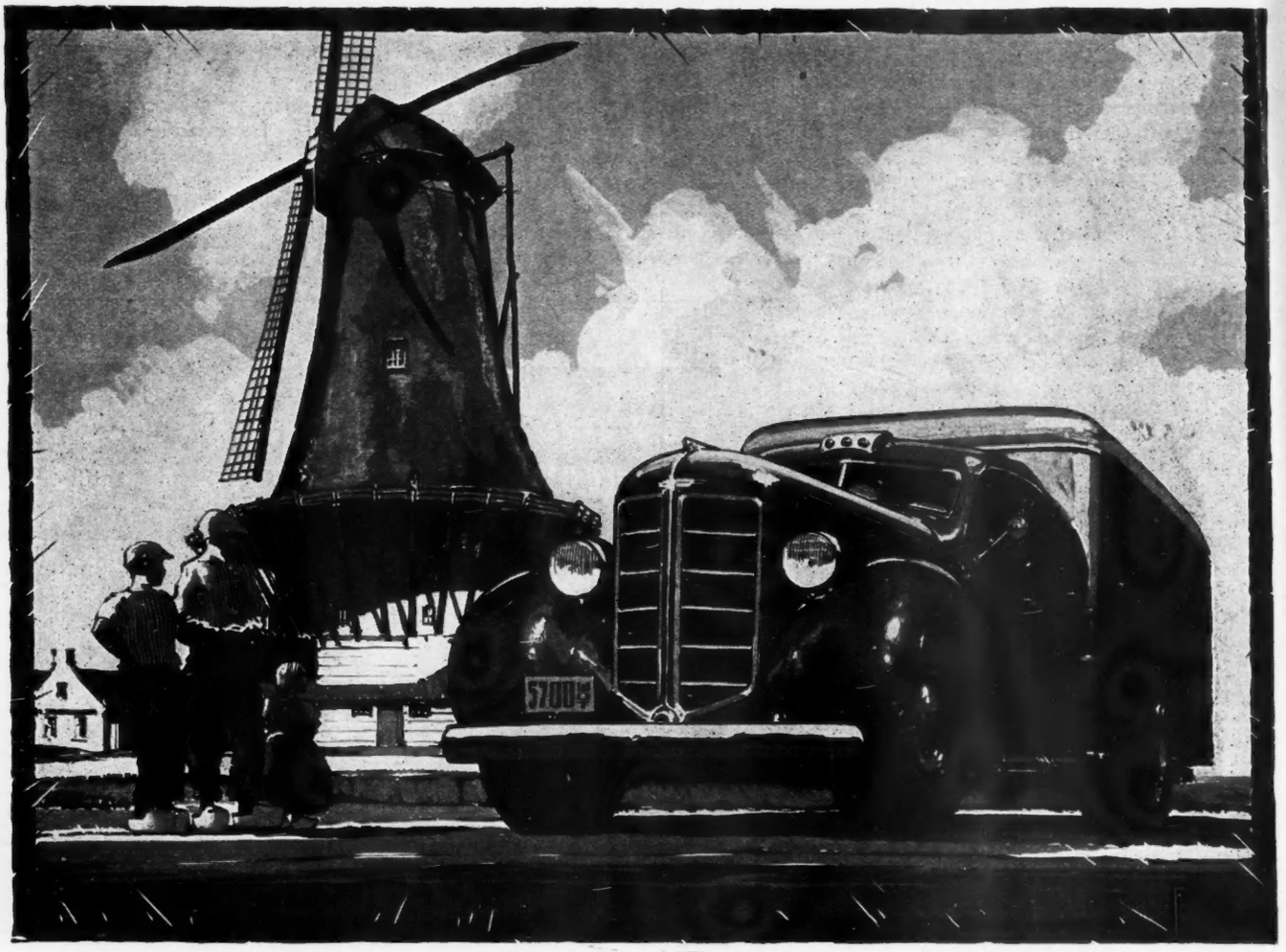
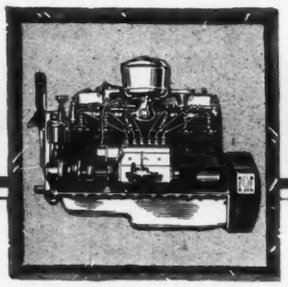
HERCULES DIESEL ENGINES STIMULATE AMERICA'S EXPORT SALES



The use of Diesel power for trucks and buses in the United States has shown a marked increase since the introduction of high-speed Hercules Diesels. Even more pronounced, however, is the growing demand for Hercules Diesel power in foreign countries—where higher fuel costs place a premium on economical, efficient engine operation. Leading American manufacturers, including Autocar, Chrysler, Clydesdale, Diamond T, Federal, General Motors, Gramm, Hayes, Kenworth, Mack, Marmon-Herrington, Moreland, Reo, Stewart, Studebaker, Twin Coach, White and others, are shipping increasing numbers of Hercules Diesel-powered trucks and buses to foreign markets. Correspondingly prominent manufacturers of marine power plants and agricultural, industrial and oil field machinery have shown equal preference to Hercules Diesel power for both domestic and export equipment, while leading engine builders in several European countries have been licensed to manufacture and sell these well-known engines.

HERCULES MOTORS CORPORATION, CANTON, OHIO

America's Foremost Engine Manufacturer • Power Plants from 4 to 200 H. P.

HERCULES  **ENGINES**